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ECONOMIC AFFAIRS

No. 205

Industry Section From 1981 ALMANAC OF CHINA'S ECONOMY

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INDUSTRY SECTION FROM 1981 ALMANAC OF CHINA'S ECONOMY

Beijing 1981 ZHONGGUO JINGJI NIANJIAN [1981 ALMANAC OF CHINA'S ECONOMY] in Chinese pp IV 40-50, IV 57-75, IV 83-91

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CHANGES, IMPROVEMENTS IN LIGHT INDUSTRY DETAILED

Beijing 1981 ZHONGGUO JINGJI NIANJIAN [1981 ALMANAC OF CHINA'S ECONOMY] in Chinese pp IV 40-45

[Article by Policy Research and Study Office of the Ministry of Light Industry: "China's Light Industry"]

[Text] The main function of light industry is to provide consumer goods in people's daily life and is, therefore, closely linked to people's need for clothing, food, housing, and other daily necessities. Many light industrial products are needed by people in their daily life. Our light industry consists of many trades, enterprises, and workers and staff members, and forms an important sector of our national economy. Its development plays an important role in improving people's livelihood, bringing prosperity to the market, withdrawing currency from circulation, expanding export trade, providing job opportunities, increasing financial revenues and foreign exchange earnings, and finally developing the entire national economy in a healthy way.

Tremendous Change From the Past

Among all countries in the world, ours is one of those with the earliest civilization and a long history. The history of our light industrial products dates back to hundreds or thousands of years ago. Our techniques of making decorative porcelain wares and producing salt out of sea water began in the Stone Age. In the Shang Dynasty more than 3,000 years ago, the making of bronze wares and various other handicrafts were already fairly well developed. We invented paper making, ceramics and lacquer wares which helped spread our culture throughout the world and made great contributions to the enrichment of people's life.

However, because of the long feudal rule in China and the aggression and oppression by imperialism since the middle of the 19th Century, modern light industry has developed very slowly. By 1949, the total light industrial output value in the country was only 4.38 billion yuan, computed according to the invariable price of 1970 and based on information supplied by the light industry departments in charge (not including handicraft and textile industries; same as follows). This works out to a per capita value of only 8.9 yuan. There were then very few varieties of light industrial goods, and the output was low. Even the maximum output before liberation was not much. For example, the output of salt was 3,918,000 tons

(1943); that of sugar, 414,000 tons (1936); that of machine-made paper and paperboard, 165,000 tons (1943); and that of cigarettes, 2,363,000 crates (1947). By 1949, the output of light industrial products was generally reduced by one-third or one-half of the highest annual record.

After the founding of the People's Republic and under the leadership of the CCP and the people's government, the broad masses of workers and staff members in the light industry departments made great efforts to restore production, and in 1952, the output of light industrial products surpassed the highest level ever attained before liberation. During the First Five-Year Plan, we carried out a socialist transformation of the capitalist industry, commerce and handicrafts through joint public and private management and cooperative movement in handicrafts. The productive potential was liberated and, at the same time, capital construction began as a means of increasing the productive capacity. Light industry soon underwent a profound change. During these 5 years, the average progressive increase rate each year was 14.3 percent. Production was severely damaged during the Second Five-Year Plan, because of blind commandism, exaggeration and the "communist wind." In 1962, the total output value of light industry, then only in the sprouting stage, was reduced by 3 percent. Later, because of the implementation of the policy of "readjustment, consolidation, replenishment and upgrading," light industry rapidly recovered. In 1963-1965, the average annual progressive rate of increase was 13.1 percent. It met another severe setback during the 10 years of "cultural revolution." Enterprise management was chaotic; the quality of products deteriorated; the varieties were reduced; labor productivity was lowered; production costs soared; and the enterprises suffered unprecedented losses. Furthermore, the period of construction projects was long; the rate of their starting operation was low; and the economic results were poor. After the smashing of the "gang of four" in 1976, and particularly after the Third Plenary Session of the 11th Party Central Committee, there was soon a sustained increase in production. The varieties were increased and the quality was improved with remarkable economic results.

Now, the Ministry of Light Industry is in charge of the production of paper, salt, sugar, cigarettes, bicycles, sewing machines, clock and watches, battery cells, glues made of bones and leather, geletine, detergents, spices and condiments, toothpaste, matches, ink, typewriters, writing brushes, wines, canned food, milk products and other foodstuff, gourmet powder, plastic wares, leather and fur products, handicraft arts, rugs, toys, metal products for daily use, tools, metal products for construction, household electrical appliances, weights, garments, shoes, hats, stationery, sporting goods, furniture, bamboo, rattan and straw products, sundary goods, daily necessities for people of the national minority and light industrial machines, all in 43 different trades. According to 1980 statistics, there are now some 69,000 light industry enterprises with a total of 11.18 million workers and a total outout value of 96.1 billion yuan.

Despite some setbacks in the development of light industry after the founding of the People's Republic, we have on the whole achieved great success and brought about great changes.

The growth of light industry has been much faster in New China than in Old China. In 1980, the total output value reached 96.1 billion yuan, being 21.9 times that of 1949, with an average 10.5 percent annual progressive increase, or 9.6 times that of 1952--when the total annual output value was 9.96 billion yuan--with an average progressive increase of 8.4 percent each year. Such a growth rate is faster than not only that of Old China, but also those of many foreign countries. The output of the main light industrial products has also increased by a wide margin. According to statistics in 37 different products, the average annual progressive increase rate for 23 of them in 30 years has been more than 10 percent. In 1980, 13,024,000 bicycles and 7,678,000 sewing machines were produced, topping the world record. Great changes have taken place in light industry in various localities, either in the coastal areas or in the inland. Shanghai is an important base of production, export and scientific research in light industry. In 1980, its total annual output value reached 12.38 billion yuan, being 12.9 percent of the national light industrial output and occupying the first rank nationally. The total outputs in Guangdong, Shandong, Jiangsu, Liaoning, Zhejiang and Sichuan were all above 5 billion yuan and the ranks they occupied ranged from second to seventh. The inland and the remote provinces and regions, where the foundation was formerly weak, all witnessed remarkable development.

In the past 30 years, the average annual progressive rate of increase in Guangxi was 11.1 percent, higher than the national average. At present, its output of grain and sugar amounts to approximately one-sixth of the national output and ranks second in the country. Its output of canned products amounts to one-tenth of the total national output, ranking fourth in the country. Because of the development of light industry in the inland, light industrial production areas have generally expanded. In the early post-liberation period, the production of bicycles, sewing machines and clocks were limited to three or four provinces and municipalities. Even toothpaste, thermos bottles and fountain pens were produced in only five or six provinces. Now the areas producing most of the products included in state and ministerial plans has been increased to include 27 or 28 provinces, municipalities and autonomous regions.

New China has a complete assortment of light industrial products, while Old China produced only a few varieties. Before liberation, China not only produced few varieties, but also had to import accessories, spare parts, special materials and machinery for its few products. Scientific research and education was almost non-existent. Since the founding of the People's Republic, the structure of light industry has been constantly improved, with a fairly wide range of different trades, and complete setups within each trade. There has also been initial development in education and scientific research serving light industry and in the production of light industrial machinery. A number of newly-emerging trades for the production of wrist watches, plastic products, light sensitive materials, essences and spices, synthetic detergents, synthetic fatty acid, and household electrical appliances have been established and developed. In the old trades, new products of a fairly high technical level are being produced. For example, the many different types of industrial technology used in the paper industry can be used to produce almost anything for daily needs. The salt industry has developed into the salinization industry; the battery cell industry is now able to produce silver-zinc battery cells of the button type; the electric light source industry is now producing solar lamps and many types of special lamps; the metal industry serving daily needs and the musical instrument industries have also developed the production of electronic products. Within every trade, there is now ample productive capacity for the production of special materials, semifinished materials, accessories and spareparts, thus adding to the capacity of producing complete sets of equipment. In the clock and watch industry, for example, there is now a complete system capable of producing almost everything from clock and watch accessories and spareparts (jewel ball bearings, shock-proof devices, hair springs, and clockwork springs) to clock and watch shells with special machine tools besides a system of scientific research in clock- and watch-making. In the electric light source industry, there is also a complete system for the production of tungsten-molybdenum materials, light sockets and fluorescent light powder. In the light-sensitive material industry, there is now self-sufficiency in photographic film and paper and near self-sufficiency in film base. Education, scientific research and machinery production serving light industrial production have been developed from scratch. Senior secondary education and various forms of vocational education are being gradually developed. There are now 13 light industrial colleges and 20 light industrial vocational courses included in 10 comprehensive industrial institutes of higher learning, in addition to more than 70 secondary vocational schools. Since the founding of the People's Republic, more than 17,000 students have graduated from universities and some 29,000 others have graduated from secondary vocational schools after receiving training in light industry. There are now a total of 341 scientific and technological research institutes in the light industry sector with some 27,000 workers, and a number of professional scientific research personnel in the large and medium-size enterprises. Many experts distinguished in technical innovation have emerged among these enterprises. Soon after liberation, the annual output of light industrial machinery was only several hundred tons. The annual output in 1980 was 130,000 tons, and we are now able to produce various types of special equipment.

The technical level in light industrial production in New China has continued to rise, while in Old China, the technical level remained very low. In Old China, apart from a fairly high level of handicrafts including handicraft arts, light industrial technology was very backward; the quality of products was poor; and the varieties and designs were very limited. Since the founding of the People's Republic, light industrial production technology continued to improve along with the improvement of quality and increase of varieties. A large number of brand name and fine quality products are now well received by the consumers. According to incomplete statistics, there have been nearly 2,000 important scientific achievements since the founding of the People's Republic. The 201 achievements which won awards in the National Science Conference in 1978 played an important role in raising the scientific and technological level in various trades and professions. Some trades engaged in handicrafts, or basically handicraft production, have become highly mechanized. For example, approximately 40 percent of sea salt production are now mechanized, while more than 80 percent of mineral salt is now processed through vacuum distillation. In those trades originally engaged in mechanized production, marked changes have occurred in their production techniques after technical innovations. The degree of mechanization in large sugar refineries has been raised from approximately 50 percent to 90 percent, and part of their work procedure is automatically controlled by single engines. In the Guangzhou General Flashlight Plant which produced one half of the entire flashlight output in the country, automation or semi-automation has been accomplished in 40 percent of its production process. There are also automatic production lines for glass bottles, table tennis balls and plastic drawing pins, while the use of electronics, microwaves, lasser, far infra-red rays, electrodialysis and silicon control are being used and popularized in some trades.

In New China, light industry is an important source of national revenues and foreign exchange earnings; in Old China, many light industrial products were imported at high prices in foreign exchange. Since the founding of the People's Republic, there has been a constant increase in the export of light industrial products in addition to their supply on the home market. These products have helped accumulate funds and foreign exchange earnings for national construction. In 1980, the national light industry sector yielded a total of 21.6 billion yuan in the form of state profits and taxes.

Since 1949, a grand total of 261.9 billion yuan has been remitted to the state. The proportion of profits and taxes from this source in the total national revenue has continued to rise. In the period of recovery, it was 5.1 percent; in the First Five-Year Plan, 7.7 percent; in the Second Five-Year Plan, 13 percent; in 1963-1965, 14.8 percent; in the Third Five-Year Plan, 15.9 percent; in the Fourth Five-Year Plan, 17.5 percent; and in 1980, it was up to 20 percent. The export of light industrial goods has also continued to increase. In 1953, only some 50 different products were exported; now, more than 700 different products are being exported to more than 150 countries and regions. In 1980, foreign exchange earnings from the export of light industrial goods totaled 4.4 billion dollars, being 24.5 percent of the total national export earnings. Since the founding of the People's Republic, a grand total of 24.8 billion dollars has been earned. The proportion of foreign exchange earned form the export of light industrial goods in the total national foreign exchange earnings from export has also continued to increase. It was 5.1 percent during the recovery period; 8.7 percent during the First Five-Year Plan; 16.6 percent during the Second Five-Year Plan; 19.2 percent in 1963-1965; 20.5 percent during the Third Five-Year Plan; 20.7 percent during the Fourth Five-Year Plan; and reached the peak of 26.4 percent in 1977.

In New China, light industry supplies low-price and fine-quality goods for people's daily needs, whereas in Old China, many light industrial goods were denied to the broad masses because of exhorbitant prices. Since the founding of the People's Republic, many low-price and fine-quality light industrial products have been produced to improve people's livelihood and to bring prosperity to the rural and urban markets. In 1979, the total volume of retail sales in the light industry sector amounted to 51.18 billion yuan, being 25.8 percent of the total national retail sales. Compared with the early post-liberation period, the output of light industrial consumer goods has been remarkably increased. According to statistics on 20 principal light industrial products, the average per capita consumption in 1980, compared with that of 1952, increased by 16-31 times in wrist watches, clocks, bicycles, aluminum cooking utensils, enamel basins, battery cells, leather shoes and cloth shoes; 1.6-3 times in fountain pens, sugar, soap, porcelain mugs, flashlights, cigarettes and liquor. Large quantities of the "three major items" (bicycles, sewing machines and wrist watches) have been supplied to the countryside, and their availability in society has been greatly increased. In the past, bicycles were called "foreign horses." Now, peasants in the north fondly call them "little donkeys that eat no grass." By the end of 1980, there were 90 million bicycles in the country averaging one for every 11.3 persons; more than 48 million sewing machines, averaging one for every 4.3 households; and 130 million wrist watches, averaging one for every 7.5 persons. The price disparity between light industrial products and agricultural products is being gradually reduced. The official retail price of salt is now 0.15 yuan per jin at the highest. Gone are the days when, as in Old China, each jin of salt could be exchanged for 1 dou of rice.

Active Readjustment and Accelerated Development

In New China, the development of light industry was something which Old China could never hope to achieve, as everyone can see. However, the guiding principle in economic construction has for a long time one-sidedly stressed the development of heavy industry and "taking steel as the key link" with the result that development of light industry was far from adequate for the improvement of people's livelihood. From 1949 to 1978, heavy industry expanded 90.5 times, while light industry expanded only 19.7 times, and there was a serious disproportion between heavy and light industries. For many years, there has been a shortage of supply in light industrial goods, and most of the 66 principal industrial products included in state and ministerial plans were short of the demand. Production technology in many light industry enterprises was backward, and the labor productivity was low. Some light industrial products were of inferior quality and there were not enough varieties and designs. Some of these products have remained unchanged for decades. In 1979, the Party Central Committee and the State Council laid down the eight-character policy of readjustment, restructuring, reorganization and upgrading. One important aspect of the national economic readjustment is the readjustment of the proportionate relationship among agriculture, light industry and heavy industry, and to accelerate the development of agriculture and light industry. In the past 2 years, the state has in a planned way slowed down the development of heavy industry and adopted a series of policies and measures including the principle of "six priorities" (priority in the supply of raw materials, fuel and power; priority in measures for tapping potential, renovation and transformation; priority in the supply of resources for capital construction; priority in bank loans; priority in the use of foreign exchange and in importing new technology; and priority in the use of communications and transportation facilities) to promote light industry. In the past 2 years, with growing support from various quarters, the light industry departments have done a great deal of work in readjustment and restructuring, and the industry itself has been fast developing. The total light industrial output value in 1979 was 6.8 percent more than in 1978, and that in 1980 was 14.3 percent more than in 1979. The output of the principal products has increased by a wide margin. In 1980, the output of six of the 17 principal products increased by 20 percent above that of 1979, and another nine of them increased by a range of 10-20 percent. The outputs of bicycles, sewing machines, clocks and watches, cigarettes, leather, cloth-shoes, garments, glass for daily use and household electrical appliances increased by more than 16 percent over those in 1979. The production of some products have even been more than doubled. The tight supply of some consumer goods on the market, such as stationery paper, detergents, light bulbs, iron pans and milk powder, has gradually become relaxed and the export of light industrial goods has also increased rapidly. In 1980, the export volume was more than that of 1979 by 18.3 percent. In addition to the increase in output, the light industry departments also paid great attention to the following tasks in the past 2 years:

1. Instead of output and output value, quality and varieties are now receiving greater attention.

In the Third Plenary Session of the 11th Party Central Committee, it was decided that the focus of party work should be shifted to socialist construction. While exhorting all light industry departments to increase their output, the Ministry of

Light Industry also stressed the need to improve the quality and increase the varieties. Thus the improvement of quality and increase of varieties became the central link for the development of light industry, and this job was steadily carried out. After a careful study in the present conditions of the quality of goods and in the market needs at home and abroad, plans for upgrading the products were worked out to provide distinctive goals for all policies and measures. Mobile exhibitions in which domestic and foreign light industrial products were compared, were held in Beijing, Shanghai, Wuhan and Chengdu, and workers in light industry enterprises in the neighboring provinces and regions were organized to visit them, to learn from the advanced units and to broaden their vision. The enterprises have extensively strengthened the basic technical work and set up an improved system of total quality control. By now, more than 1,000 enterprises have tried out this system and formed more than 16,000 quality-control groups. Some principal trades have also set up quality test centers and firmly adhered to the principle of evaluating work in terms of product quality. In 1980, 17 national quality test centers and 26 regional test stations were formed. In 1979 and 1980, the Ministry of Light Industry inspected and evaluated 70 and 89 different products respectively, commended the advanced units and prodded those lagging behind. The quality of light industrial goods has steadily improved, and their designs and varieties have continued to increase in the past 2 years. The production of former brand name products were resumed and a number of new brand name products appeared. Some 2,000 items were recommended by different localities as fine-quality goods; 28 of them won gold medals and another 70 won silver medals from the state. The Ministry of Light Industry awarded certificates of fine-quality products to 815 items. Among the winners of gold and silver medals were not only such brand name products as Maotai wine of Guizhou, Wuliangye wine of Sichuan, porcelain wares with floral designs and colorful pictures produced in Jingdezhen of Jiangxi, colorful tea sets produced in Liling of Huan, Xuan paper [for Chinese painting] and Chinese painting ink of Anhui, the Zhang Xiaoquan Brand scissors of Hangzhou, the Wang Mazi Brand scissors of Beijing, the Fengchuan Brand woolen rug of Tianjin and other traditional brand name products; but also the Flying Dove Brand 28-inch Model PA 22 bicycle of Tianjin, the Yongqiu Brand 28-inch Model PA 13 of Shanghai, the Butterfly JAI-1 Model household-use sewing machine, the Hero Brand Model 100 fountain pen of Shanghai, the Shuanghe Brand electronic computer paper of Shandong, the Jingjiang Brand thermos jars of Hubei, the Hongmei [Red Plum] Brand sweetened condensed milk of Heilongjiang, the Gold-Cup Brand soccer ball of Tianjin, the White-Dove Brand microporous plastic slippers of Fujian, the rattan ware of Nanhai Rattan Factory in Guangdong, the embroidered table cloth of Changshu in Jiangsu, the Triangle Brand stainless steel table set of Tianjin, the Sanwan [Three Circles] Brand padlock of Shandong, the men's shirt of Tiantan Brand in Beijing and the Hailei Brand in Shanghai, the Xiamen Brand photographic paper of Fujian and some others totalling several scores. According to preliminary statistics, approximately 60 different products have reached or approached the international quality level. More than 10,000 new products were successfully trial produced in the past 2 years, and many new light industrial products of new varieties and new designs in attractive packings are now available on the market and are well received by customers. From their experiences, many light industry enterprises are now aware that the lifeline of light industry lies in whole-hearted service to the people by improving the quality and increasing the varieties and designs of their products. There will be future development for those enterprises which regard product quality as their primary concern, but not for those which fail to upgrade their products and lack competitive power.

2. Adjustment of product mix, reduction of goods in excessive supply and increase goods in short supply are carried out in order to produce easily marketable goods.

In implementing the policy of national economic readjustment, great attention is being paid to the adjustment of the product mix within light industry. Most of the light industrial products are in great demand on the market; however, because of inadequate productive capacity and the limited supplies of raw and semifinished materials, there is now a shortage of supply for the demand. Yet, as a result of changed market conditions, the productive capacity for a small number of products is excessive. A timely adjustment of the product mix by reducing the goods already in excessive supply to make up for those now in short supply will enable light industrial production to develop according to market needs. Based on the changing market demands at home and abroad, the Shanghai Municipal Light Industry Bureau curtailed the production of goods already in excessive supply to make up for those in short supply; reduced low-grade products and increased the high-grade ones; and developed the production of brand name products. In 1980, this bureau concentrated its attention on the production of 106 easily marketable items, the net output value of which exceeded that of 1979 by 0.21 billion yuan. Among these products, the output value of bicycles increased by 10 percent (including a 42.9 percent increase for medium- and high-grade products whose ratio rose from 28.2 percent to 36.67 percent); that of sewing machines by 6.04 percent (including a 10.19 percent increase for medium- and high-grade products and a ratio increase from 48.62 to 50.54 percent); and that of wrist watches, by 17 percent (including a nearly 100 percent increase for watches with calendar and 64.7 percent for small women's watches). In the past 2 years, the Shanghai Handicraft Bureau readjusted the orientation of production for 47 enterprises and expanded their productive capacity for goods in short supply. The bureau concentrated its efforts on the production of 100 different products in short supply. The output value in 1979 was 32 percent over that of 1978 with an additional output value of 0.2 billion yuan; and the output in 1980 was again 37 percent over that of 1979, with an additional output value of 0.3 billion yuan. Through adjustment of the product mix, both bureaus have greatly increased their export trade, and their net increase totaled 0.82 billion yuan with an average annual increase of 18.4 percent.

Aside from adjusting the product mix, some regions where light industry is fairly concentrated, also readjusted the structures of trades and enterprises, and developed specialization and coordination and economic integration in an attempt to tap productive potential. Some of these regions even readjusted the technological pattern of production so as to combine the adjustment of product mix with the popularization of new technology and new process, and to raise labor productivity and the technical level of production. Some regions also readjusted the makeup of their raw and semifinished materials in order to better suit the needs of production development.

3. Along with the readjustment, experiments were carried out in the expansion of decision-making power for the enterprises in an effort to improve enterprise management.

Enterprise management was very chaotic during the "Great Cultural Revolution" because of the interference and sabotage by Lin Biao and the "gang of four" in light industry. After the smashing of the "gang of four," particularly after 1979, great attention was paid to the consolidation of enterprises, and by the end of 1980, more than 500 large and medium-size light industrial enterprises had been basically consolidated. The majority of enterprises under the provinces (regions) and municipalities were also undergoing consolidation; for the widely scattered enterprises under the counties, however, the work of consolidation has been uneven--some with good and others with poor results. On the whole, however, the achievement was remarkable, because through consolidation, many enterprises are now staffed with young and healthy cadres who are familiar with production technology and business management. The structure of the leading bodies has undergone a profound change. There has also been continued development in the formulation of rules and regulations aiming at increasing production and practicing economy, increasing income and curtailing expenditures, and setting up and perfecting the system of job responsibilities; in strengthening first-hand records and the work of statistics and computations; in the fixing of consumption quotas for raw and semifinished materials, energy, and labor time, and in their evaluation; and in economic accounting. In Liaoning Province, 133 light industry enterprises have practiced the system of internal contracts for "selling on commission," profit-sharing by workshops, cost accounting, and awarding bonus according to the percentage of workpoints. Their economic results have been improved. Through consolidation, many enterprises have improved their management and attained the objective of balanced, safe and civilized production.

The expansion of decision-making power for enterprises is an important link in the restructuring of economic management. Experiments have proved their value in arousing the enthusiasm of the enterprises and their workers in developing production and in increasing output and income. Experiments in the expansion of decision-making power for industrial enterprises began in Sichuan Province in September 1978. By the end of 1980, according to statistics in Sichuan, Shanghai, Beijing, Tianjin and 11 other provinces and municipalities, the experiment has been carried out in 861 enterprises. In the past, there was no connection between the results of production and management on the one hand, and the personal interests of the workers and staff members on the other. Nobody cared to do anything about the prevention of waste, and it was difficult to overcome the habit of extravagance. After the expansion of their decision-making power, however, the enterprises could share the profits which is directly related to the workers' benefits. Thus an atmosphere of meticulous calculation and strict budgeting in financial management prevailed. Many enterprises are now carefully analyzing their economic activities from the entry of raw materials to the exit of finished products. Many technical, economic and spending indices have been classified into sub-indices for which individual workers are held responsible. Thus people at all levels in the plant are held accountable for the business results. In the past, the enterprises organized their production only in accordance with the directive from the higher authorities and gave no thought to whether the products would be marketable. Now, they are organizing their production according to market demands and striving to increase their sales. In the past, power was concentrated in the departments in charge at the higher levels, and in case of any problem with the arrangement of production tasks or the supply of raw materials, the enterprises had usually to wait for decisions to be made at the higher levels. After the expansion of their decision-making power, the enterprises began to enjoy their independent economic benefits and bear heavier economic responsibilities. They have now to solve the problems on their own initiative and make every effort to increase their production and income. In 1980, the total output value of the Chongqing Municipal First Bureau of Light Industry in Sichuan exceeded that of the previous year by 12.8 percent, and the profits also increased by 25 percent, but its 32 affiliated enterprises with expanded decision-making power had even better success with an increase of 18.9 percent in their total output value and a profit increase of 30.5 percent. In 1980, the Chongqing Clock and Watch Company, undergoing the experiment of "paying taxes instead of turning in profits" to the state, increased its total output value by 68 percent and its profits by 1.24 times. The economic results were remarkable. Since the enterprises with expanded power can retain part of the profits and a greater share of the fixed asset depreciation funds, they now have the economic power to develop their own production and to speed up their expanded reproduction. The workers' collective welfare has also been initially improved. In 1980, again, the Tianjin No 3 Plastic Plant obtained 906,000 yuan from the retained profits. This amount is equivalent to one-third of the total amount of state investment in the past 10 years. Out of this amount, 421,000 yuan was appropriated for expanded reproduction. It has purchased hydraulic presses, kneaders and stamping machines, and increased the production of foam-rubber slippers. Because of their new and attractive designs, these slippers are selling well in more than 10 countries and regions.

4. Through the regulative role of the market guided by state planning, part of the products can now be sold by the enterprises themselves.

For a long time, production and marketing of light industrial products were conducted under the old system of control by the industrial and commercial departments in charge and the products were exclusively procured and marketed by the commercial departments. Under this system, there could be only one single channel of circulation which might be easily blocked up, and direct relationship between the enterprises' production and the masses' requirements was lacking. Thus production and marketing became disjointed with the result that goods were sometimes out of stock or overstocked. This is disadvantageous to both production and consumption. Since 1979, the light industry departments and enterprises in many localities have strengthened their contacts with the commercial departments, and while developing their production, they also carefully studied the market conditions and the regulative role they play under the guidance of state planning according to the policy adopted by the central authorities, and then actively developed the sales of their own industrial products. Light industrial production was thus enlivened.

In the past 2 years, the light industry departments have gradually expanded their own sales. According to incomplete statistics at the end of 1979 by the light industry departments in 21 provinces, municipalities and autonomous regions, 3,788 retail departments have been set up by bureaus, companies and enterprises for the sale of their own products, and the bureaus and companies have also set up a number of supply and market managing departments or service departments to take care of wholesales and retail sales. In 1980, more marketing organs were formed. The selling of products by the producers have taken many flexible forms. In addition to retail sales and wholesales, many good forms have been introduced through practice, such as meetings for the exchange of various supplies, visits to other provinces and municipalities to push sales and to investigate market conditions, exhibition and marketing meetings, supply meetings, invitating commercial workers to inspect samples before placing orders, direct contacts between plants and stores, trial marketing centers for new products inside the stores, consignments to large stores, and so forth. In September 1979, the Ministry of Light Industry held a national exhibition and sales meeting for new light industrial products in Beijing, participated by the light industry departments of 28 provinces, municipalities and autonomous regions. More than 4,000 different products were on display for 1 month. Some 800,000 people visited the exhibition and the volume of sales totaled 31.26 million yuan. This was a large-scale exhibition-sales meeting, which produced a strong impact on the sales of industrial products by the producers themselves. The products sold in this manner were mostly from above-quota production, from what had been left over after planned procurement by the commercial departments, from new products, from the products made of materials bought with self-raised funds, from what the commercial departments did not want to procure or sell on the producers' behalf, and from the traditional products sold by the producers. The proportion of proceeds from such sales has been increased. According to incomplete statistics compiled in 1979 by the light industry departments in 21 provinces, municipalities and autonomous regions, the proceeds from this source amounted to 2.88 billion yuan, being 5.1 percent of the total output value. The proceeds of the First Light Industry Bureau from the same source amounted to 4 percent, and those of the Second Light Industry Bureau amounted to 10 percent of the total output value. From January to September 1980, according to the statistics by the second light industry departments in 26 medium-size cities, the sales of products by the producers themselves amounted to 1.39 billion yuan, being 38.8 percent of the total output value.

The adoption of the market's regulative role, guided by state planning has helped develop the sales of industrial products by the producers and promote production. First, it plays a positive role in insuring the fulfillment of the state plan. After the development of the direct sales of industrial products on the market in 1979, the producers could sell whatever the commercial department did not procure. The slow-selling goods became fast-selling goods, and the idling of productive capacity and the decline of production because of overstocking or slow selling quickly ended. Production was quickly increased in the second half of the year to make up for previous losses and to insure the fulfillment of the annual plan. Direct sales of industrial goods on the market further developed in 1980, and the combination of production with marketing was an important factor for the large-scale increase of production. Secondly, this form of sales has strengthened the concept of serving the consumers, and upgrading the products, resulting in the appearance of new products and new varieties. Formerly, the products of the Dandong Wrist Watch Plant were of only one variety and three designs. The quality was poor and the commercial departments were overstocked with these watches. Since 1979, this plant has sent people to visit commercial stores and consumers to solicit opinions, and tried hard to improve its product quality. The number of designs for its watches was later increased to 58, and some 450,000 of them were delivered to more than 670 selling units to replace the old ones which were left unsold. The plant thus recovered its goodwill and its products are now selling well on the domestic market besides being exported to Hong Kong. Thirdly, this form of sales helps the producers to keep abreast of the changing market conditions so that they can produce easily marketable goods under proper guidance and with fresh vitality. At present, the selling of industrial products by the producers themselves has become an indispensable link in commodity circulation. Procurement by the commercial departments and direct sales of industrial products on the market are now mutually supplementary and will be helpful in enlivening the market.

5. Economic results can be improved if investment and loans are judiciously used in capital construction.

In the past 2 years, capital construction projects for light industry were carried out strictly in accordance with plans, under stricter control and a system of check-up on the work. The main effort has been directed in improving the economic results of the investment. This has changed the old practice of paying no attention to either the rational need for investment or its economic results. In 1979, 950 million yuan were actually spent out of the estimated national investment in light industrial capital construction; in 1980, the amount actually spent was 698 million yuan. In both years, the state plans were overfulfilled. The value of fixed assets in these 2 years was raised by 77 percent and 78 percent respectively. Thirty-two large and medium-size projects were fully commissioned while 29 others were partially commissioned. There is now increased productive capacity for paper, sugar, detergents, light bulbs, fine aluminum products, porcelain and other products for daily use. At the same time, the proportion of investment in housing construction was increased, and a total floorspace of 4.3 million square meters was completed. From the way the construction plans were fulfilled and the completed projects were handed over to be used, capital construction in 1979 and 1980 has produced the best results in recent years.

In capital construction, we have begun to substitute bank loans for state allocations as required by the program of restructuring. In using these loans, the enterprises have to bear explicit economic responsibilities; and in deciding on the projects, they must carefully consider various factors, such as the marketing of their products, the conditions of construction, their ability of repayment, and the prospects of tapping potential and speeding up technical renovation and transformation. After obtaining the loans, they have to carry out strict budgeting and meticulous calculations to be sure that the projects can be quickly commissioned and yield early returns in order that they can redeem the loans without undue delay. That is why many projects have yielded remarkable economic results. In 1980, the light industrial section had medium- short-term loans totaling 700 million yuan from the People's Bank, and its newly increased productive capacity in the same year was as follows: 1.5 million bicycles, 900,000 sewing machines, 550,000 clocks, 2 million wrist watches, 25,000 tons of beer, 21,000 tons of high-quality liquor, 8 million sheets of pig skin, 2.97 million pairs of leather shoes, and 2.7 million sets of steel and wooden furniture.

6. Scientific research and education should be stepped up, and the weak links in light industry should be strengthened.

Since our limited funds are mainly used in expanding productive capacity, scientific research and education in light industry has been all along a weak link. In the past 2 years, during the readjustment in the internal structure of light industry, the leading bodies of scientific research organs and high- and middle-level institutes of education have been adequately staffed, while investment from state allocation and with foreign exchange was suitably increased for their capital construction. A number of urgently needed instruments and equipment were bought, and facilities for scientific research and education have begun to improve. The number of scientific research institutes in the light industry sector has been increased from 253 in 1978 to 341, and the personnel has been increased to more than 3,000. While specialized organs for scientific research are being developed in the light industry sector, the enterprises are also stepping up their work in scientific research. Under the First Light Industry Bureau in Shandong, for example, 85 enterprises have set up their scientific research institutes (sections). Scientific and technical achievements have also been obtained in many localities. In 1978-1980, the light industry departments in various localities applied for the award of prizes for 1,331 items of scientific and technical achievements; 671 of them won prizes after evaluation by the Ministry of Light Industry; and 279 prize winners are now already used in industrialized production. These projects have helped solve a number of fairly important technical problems in light industry with remarkable technical and economic results. Shanghai and Suzhou have successfully completed the research and production of high-speed laser drills for making holes in watch jewels at the rate of 10-16 per second. They are up to the international standard. In 1980, the number of students attending light industrial and other science and engineering institutes of higher learning and vocational schools in the light industry sector was increased to more than 13,000, and that of students attending secondary vocational schools was increased to more than 16,000, representing increases of 50 percent and 72 percent respectively more than the numbers in 1978. At the same time, education for workers and staff members has steadily increased. In addition to sparetime literacy classes and study classes for technology and management run by a small number of enterprises, there are various other forms of universities for workers with an enrollment of more than 16,000 students. There are also more than 8,000 workers attending secondary vocational schools. The number of technical schools has been increased to more than 250, with more than 28,000 students attending. The quality of education has been greatly improved.

A Bright Future

Great achievements have been won in light industry in the past 2 years. However, because we have for a long time stressed priority for the development of the means of production and overlooked the need for the production of consumer goods, the relationship between agriculture, light industry and heavy industry is now seriously out of proportion, while light industrial production is not adequate for national economic development and for people's livelihood. Such a situation cannot be quickly changed. At present, the technical equipment used in light industrial enterprises is rather backward; the plant buildings are rather crammed; the technical force is weak; the productive capacity is insufficient; production control is backward; the economic results are poor; the increase of production cannot keep pace with the increase of the social purchasing power; and the supply of certain light industrial products is still fairly tight on the market. These are the shortcomings, but there is potential for their improvement.

The development of light industry will supply more consumer goods on the market and help increase accumulation and foreign exchange earnings, besides providing more job opportunities, cutting down energy consumption, requiring shorter construction periods and yielding quick results. All these advantages are highly significant in the improvement of market supplies, the withdrawal of currency from circulation, keeping revenues and expenditures balanced, and the consolidation and development of the excellent situation of stability and unity. Promotion of light industrial production concerns the overall situation. The state has already decided to place the production of consumer goods in a strategic position and called on various trades to support light industry in order to promote the production of consumer goods.

The present situation is very favorable to light industry. In 1981 and the next 5 years, light industry will develop at an even greater speed. Readjustment in light industry should be continued and there should also be progress for this industry in the course of readjustment. While readjusting the proportionate relationship between light industry and the other sectors of the national economy, we should at the same time readjust the internal structure of this industry so that it will rest on a solid foundation. We should make use of its present foundation and spend our limited funds selectively on the technical transformation of the existing enterprises. We should strive to increase production and practice economy, improve the quality of products, reduce the consumption of raw materials and energy without reducing the speed of production, produce more easily marketable goods, stress economic results, and do more to satisfy the people's daily needs. In readjusting the product mix in 1981, we should pay greater attention to the production of bicycles, sewing machines, clocks and watches, paper, salt, plastic ware, detergents, cigarettes, sugar, beer, leather and leather goods, furniture, household electrical appliances, garments, handicraft arts and other key items. Particularly in the three major cities of Shanghai, Tianjin and Beijing as well as the other key cities of light industry, efforts should be made to produce more brand name products. The quality of products should be further improved. Besides continuing the national evaluation of light industrial fine-quality products, there should also be evaluation and selection of handicraft art products for the "Hundred Flowers Award." The role of existing enterprises should be given full play, and cooperation between industry and commerce, and between industry and foreign trade should be further strengthened. We should continue to do a good job in various reforms including the improvement of business management and speed up the development of light industry so that in the coming year, we will be able to supply more and better consumer goods for the people.

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DEVELOPMENT OF TEXTILE INDUSTRY REVIEWED

Beijing 1981 ZHONGGUO JINGJI NIANJIAN [1981 ALMANAC OF CHINA'S ECONOMY] in Chinese pp IV 46-50

[Article by Research Office of the Ministry of Textile Industry: "China's Textile Industry"]

[Text] In our national economy, the textile industry belongs to one of those industrial departments which has been developed fairly early on a relatively solid foundation. Through socialist transformation and socialist construction after the founding of the People's Republic of China, this industrial department has gradually become capable of producing a fairly complete assortment of products, with raw materials and equipment basically available domestically, and a fairly high standard of production technology. There are now more than 11,900 textile mills with some 4.29 million workers throughout the country. Their annual output of cotton, woolen, linen, silk and chemical fiber fabrics is more than 10 billion meters which has enabled us to supply many types of textile products on the urban and rural markets at home, and to make definite contributions to the accumulation of state construction funds and the development of foreign trade.

A Historical Review

Our textile industry dates back to the 1880's, and has by now a history of 100 years. If we say that the 60 and more years in the history of the development of textile industry in Old China is a period of increasing disintegration and desperate struggle under the oppression of the "three big mountains," then the 30 years in New China for this industry has been a period of continual development under the leadership of the CCP and the people's government along the socialist road, and through self reliance and hard struggle.

Cotton textile in our textile system is the trade with the broadest scope and the most solid foundation. In 1979 the output of pure cotton yarn and mixed cotton and chemical fiber yarn amounted to 2.63 million tons, and that of cotton cloth was 12.15 billion meters, which ranked first in the world.

Woolen textile industry has also undergone a fairly extensive development. In more than 70 years, from 1876--when Zuo Zongtang established the first woolen textile mill in Lanzhou, called the "Gansu Wool Weaving General Bureau"--to 1949, only 130,000 woolen spindles had been installed. After 30 years of construction following the founding of New China, the number of these spindles is more than 3 times the sum total of the previous 70 years. The output of woolen fabrics in 1979 was 90.17 million meters and that of woolen yarn was more than 40,000 tons.

China was the first country to produce silks and satins in the world. As early as 2,000 years ago, attractive silk products were already on their way to various western countries along the "Silk Road" and became well known throughout the world. Since the beginning of the 20th Century, our silk industry suffered from the ravages of the predatory forces at home and abroad, and its production gradually declined. On the eve of liberation, the output of silk was only about one-quarter of the highest amount ever produced. After liberation, the state energetically encouraged the growing of mulberry trees and the raising of silk worms, and the silk industry gradually recovered. At present, the number of silk reeling machines is nearly 10 times that in 1949. In 1979, the silk output was 29,749 tons, and that of silks and satins was 663,450 meters. Silk is still one of the important commodities in our foreign trade.

Linen textile has also undergone remarkable changes. In addition to the rapid growth of the jute industry, a number of enterprises engaged in flex and ramie textile industries, have been newly built. At present, the number of spindles for various types of linen textile is about 5.9 times that in 1949. In 1979, 344 million gunny sacks, 20.81 million meters of flaxen fabrics and more than 15 million meters of ramie fabrics were produced.

In the past 30 years, the development of textile industry is manifested not only in the increase productive capacity, but also in the following achievements:

1. Improvement in the geographic distribution of zones. In Old China, textile industry was mostly concentrated in the coastal areas, and three cities, namely, Shanghai, Qingdao and Tianjin, which owned approximately 70 percent of all the cotton spindles in the country. Shanghai alone owned approximately 75 percent of all the woolen spindles. Since the early 1950's, China began a large-scale economic construction program, and under the guidance of state planning, a number of textile industrial bases were newly established in Hebei, Henan, Shaanxi and other raw material producing areas. At present, the number of cotton spindles in the cotton producing areas amounts to two-thirds, and that of wool spindles in wool producing areas amounts to approximately one half of the national total. Textile industry of varying scales is also being developed in some frontier, remote and national minority regions, such as Nei Monggol, Xinjiang, Qinghai, Ningxia and Yunnan.

2. The vigorous development of chemical fibers along with the increased production of natural fibers. Old China could not rely on domestic resources for textile raw materials. In 1946, one half of the cotton and most of the wool used by all textile mills in the country had to be imported. After liberation, the party and the state adopted a series of economic policies and measures to restore and develop agricultural and animal husbandry production which aroused the enthusiasm of the peasants and herdsman. Compared with 1952, the amount of cotton, wool and silkworm cocoons procured in 1979 increased by 1, 3 and 3 times respectively. Other raw materials such as ramie, cashmere, tussah silk and rabbit fur, were also produced and utilized.

While developing the production of natural fibers, we also paid great attention to the chemical fiber industry. In the early 1950's, the Baoding Artificial Silk Mill and the Beijing Synthetic Fiber Experimental Factory were built, followed by the Vynylon Mill and Acrylic Fiber Mill in the mid-1960's. In the 1970's, the state increased its investment in the chemical fiber industry and imported new technology for petrochemical industry. Thus large modern petroleum (natural gas) chemical industry enterprises were set up in Jinshan County of Shanghai, Liaoyang Municipality of Liaoning Province, Changshou County of Sichuan Province, and Tianjin Municipality. This gave a strong impecus to the development of chemical fiber industry. At present, chemical fiber accounts for 12 percent of the composition of textile raw materials.

3. Manufacturing textile equipment through self-reliance. In the 30 years since the founding of the People's Republic, the development and growth of textile industry have been possible through the spirit of self-reliance in manufacturing the machinery and equipment. Old China could only do certain maintenance jobs, but could not produce any textile equipment. After liberation, we got all the machinery maintenance factories under the textile industry departments organized along the lines of specialization and division of work so that complete sets of equipment could be produced in the country. Thus a system of textile machinery manufacturing industry began to take shape. After 30 year's construction, this industry has developed to such an extent that we can produce complete sets of machinery for 1,200 different types of products of the cotton textile, woolen textile, linen textile, silk, knitting printing, chemical fiber and six other trades. To complete the sets of equipment used in cotton textile alone, more than 15 million spindles and some 500,000 sets of cotton looms have been produced. These quantities were not only sufficient to meet the requirements of textile industry at home but also enabled us to export complete sets of equipment including more than 1.8 million spindles in aid of foreign countries.

4. Continual improvement of products. For many years, great attention has been paid to the relationship between output and quality in our textile industry, and the improvement of product quality and increase of varieties and designs have been treated as matters of prime importance in production. In recent years, many enterprises have strengthened their control over various types of basic technology and some of them have exercised total quality control. In this way, the standard of products have been marked raised. Our cotton fabrics and other cotton textile products are enjoying fairly good reputations at home and abroad, and our raw silk and silks and satins are also of a fairly high standard. The Double-A raw silk, considered as a high-grade material in the early 1950's, is now in common use, and the 5-A and 6-A fine-quality raw silk can now be produced by filature in many enterprises. The silks and satins of typical Chinese style produced in Suzhou, the silk fabric with printed floral designs produced in Shanghai, the dacron material of Iceberg Brand produced in Beijing and the Shuiyue [Water and Moon] Brand pure cotton kakhi produced in Changzhou are all fine-quality materials with large varieties and attractive designs. They are all selling well at home and abroad.

5. Raised standard of science and technology and education in textile industry. There are now in our country 14 textile high schools with an enrollment of some 10,000 students. The number of engineering and technical personnel in the entire

sector has been increased from some 7,000 before liberation to more than 50,000. These educational facilities have been a great help in raising the standard of textile science and technology. The per-unit output of our cotton spindles ranks among the foremost in the world. At present, important achievements have been won in the technique of air-stream spinning, self-twisting yarn spinning, and electrostatic spinning; in the use of jet looms, shuttleless looms, and gripper shuttle looms; and in mold design printing, transfer of printed designs and other new methods of weaving and spinning. Important achievements have also been won in the techniques of dyeing and finishing.

Along with the production and development in the textile industry, the technical skill of the broad masses of workers and staff members has also been raised through training in sparetime universities and secondary vocational schools. At present, we have a mighty technical force capable of designing, construction, installation and production management.

6. Rapid development in the export of textile products. In 1950, we exported only 26 million dollars' worth of textile products. In 1979, the amount exceeded 2.9 billion dollars, being more than 100 times the figure of 1950. The amount of grey cloth exported ranks first in the world, and the amount of filature silk exported amounts to three quarters of the total volume of filature silk transactions in the world. This product is being sold in 130 countries and regions and warmly received in the world market.

After smashing the "gang of four" and particularly since the Third Plenary Session of the 11th Party Central Committee, the textile industry has entered a new phase along with the shift in the focus of work and the implementation of the policy of "readjustment, restructuring, reorganization and upgrading." The State Council has introduced the "six priorities" (priority in the supply of raw materials, fuel and power; priority in measures for tapping potential, renovation and transformation; priority in the supply of resources for capital construction; priority in bank loans; priority in the use of foreign exchange and in importing new technology; and priority in the use of communication and transportation facilities) principle which provided a strong impetus to the development of textile industry. In recent years, the ratio of textile industry in the national economy has been raised, and its output value amounts to 15 percent of the total national industrial output value. The texes paid and profits handed over to the state account for more than 10 percent of the state revenues, and the textile products sold on the domestic market amounts to 20 percent of the total retail sales of consumer goods. Foreign exchange earnings from the export of textile goods accounts for about 20 percent of the total foreign exchange earnings from the export trade.

Progress in the Midst of Readjustment

In 1980, readjustment of the national economy has entered its second year. During the past 2 years, we have readjusted the proportionate relationship between agriculture, light industry and heavy industry in the light of realities in order that the growth of textile industry will surpass that of heavy industry and become one of the most fast developing industrial departments.

1. Sustained rise in production with various indices up to the new standard. With the support of the relevant departments, the textile industrial departments have actively implemented the measures for increasing production by opening up more avenues for importing raw materials and processing materials imported from abroad or supplied by foreign customers. In many localities, these departments have found their own sources of raw materials to expand their production.

The cotton textile and some wool and linen textile enterprises have restructured their labor system by practicing the "four-teams-on-three-shifts" system. Everyday, production is carried on in three shifts by three teams, with one team going off by rotation. There is now "rest for people but not for horses [machinery]" so that the equipment can be fully utilized.

Mutual assistance and learning from one another are being actively encouraged among different regions so as to gradually reduce the disparity in the standards of production between the inland and the coastal area enterprises. In regions where mutual assistance is active, the enterprises have succeeded in improving the quality of their products, increasing their varieties and designs, strengthening their management, reducing their consumption and production costs, and increasing both production and income.

In 1980, the total output value of textile industry reached 73.55 billion yuan, a 24 percent increase over 1979, and the state plans for the production of various principal items were overfulfilled. The output of chemical fibers was 450,000 tons, including 314,000 tons of synthetic fibers, and being 38 percent and 46.7 percent increases respectively over those of previous year. The output of cotton yarn was 16,286,000 pieces (equivalent to 2.93 million tons) and that of cotton fabrics was 13.47 billion meters (12.8 billion square meters). The increases were 11.4 percent and 10.9 percent (12 percent) over those of the previous year respectively. The output of woolen fabrics was 101 million meters and that of woolen yarn was 57,000 tons, being increases of 12.2 percent and 29 percent respectively over those of the previous year. The output of silk was 35,400 tons and that of silk fabrics was 759 million tons, being increases of 19.2 percent and 14.5 percent respectively over those of the previous year. The output of gunny sacks was 433 million pieces, an increase of 25.9 percent over that of the previous year. The taxes and profits for the state increased by 24.8 percent, and new records were set for various principal technical and economic indices.

2. Improved product quality and increased varieties and designs. In 1980, the textile sector greatly strengthened its basic technological management in order to improve the quality of its products. To strengthen their weak links in the technology of production, many localities have organized meetings for the exchange of professional know-how. In many regions, skilled workers were organized to give public performances in order to help raise the technical standards. Some localities have exercised total quality control with initial success.

In 1980, the state set up 15 quality standards for nine major categories of products. All the production plans according to these standards were overfulfilled.

Campaigns have been launched in many places with fairly good results to produce brand name and fine-quality products. More than 30,000 new varieties and designs were produced in 1980. By the end of the year, 1,714 different products of the textile sector have been designated as fine-quality products; another 328, as brand name products; and still another 80 won national prizes for fine-quality. Even the frontier, remote and national minority areas produced some brand name and fine-quality products having their own special features.

The production of easily marketable products welcomed by the masses, such as fiber knitwear of medium length, long dacron knitwear, silk quilt covers, and decorative drapes, has been raised and their varieties and designs have also been rapidly increased. There are now more than 30 varieties with over 80 floral designs for medium-length fiber knitwear.

3. Stress on commissioning and investment returns for capital construction. In 1980, heavier investments were made in textile industry according to state planning, and support for this industry with self-raised funds from local sources has also been markedly increased. The textile capital construction departments in various places are now concentrating their forces in getting the projects commissioned, and in winding up their work so that capital construction can yield better economic results. A total investment of 1.1 billion yuan, or 110 percent of the planned figure, has already been used on 34 large and medium-size projects according to state planning. Among these projects, 807 million yuan, or 124 percent of the planned figure, were within the state budget. Of the 13 projects planned to go into operation this year, 12 have been fully or partially commissioned.

Most of the key capital construction projects for chemical fibers are now in the stage of winding-up and some of them are in trial operation. The Sichuan Vynylon Mill, the first large chemical fiber plan with natural gas as the basic raw material, has been formally commissioned, and is producing up-to-standard goods. Two petrochemical fiber plans in Liaoyang and Tianjin are now in partial trial operation, while two drawn work plants in Acheng and Dandong have been completed as supporting units for the Liaoyang Chemical Fiber Plant. First stage work on the Shanghai General Petrochemical Industry Plant has been completed and accepted by the end of 1980, and it is estimated that a total of 280,000 tons of synthetic fibers will be produced with a total output value of 4.77 billion yuan, and an amount of 1.81 billion to be paid as taxes or as profits to be handed over to the states. The amount of taxes paid and profits handed over to the state represents 82 percent of the total investment in the first stage construction. The second stage construction has already begun. The construction plans for textile processing projects are being carried out smoothly.

4. Tapping potential and technical renovation and transformation for old plants, and strengthening their weak links in production. While concentrating our resources on capital construction projects, we have also achieved fairly great success in strengthening the weak links in production, in tapping potential and carrying out technical renovation and transformation, in filling in certain gaps, in solving the problems of quality and in developing the productive capacity for goods now in short supply. In 1980, the Ministry planned for 478 projects for tapping potential and technical renovation and transformation. By the end of the year, 143, or 30 percent of the total projects, had been completed. At the same time, most of the projects, had been completed. At the same time, most of the projects planned in

1978 for printing and dyeing dacron and cotton fabrics and for acrylic fiber, silk reeling were completed so as to reduce the long-standing problems with the productive capacity. While carrying out the measures of tapping potential and expanding productive capacity, many localities have repaired a number of dangerous buildings and built new warehouses and dormitories, in addition to the treatment of contaminated water.

Through new construction projects and the tapping of potential, productive capacity has been increased for 60,000 additional tons of chemical fibers. The spinning capacity in cotton textile has been increased by 880,000 spindles (including 761,000 spindles newly added from capital construction); that of woolen textile, by nearly 70,000 spindles. The capacity for finishing printed and dyed cotton and dacron-cotton fabrics has also been increased for 900 million meters more.

5. Strengthen scientific and technical work. Since the convention of the National Science Conference in 1977, scientific and technical work in textile industry has been much improved. The number of textile scientific research organs at and above the provincial and municipal levels throughout the country has been increased from 48 to 83, and the number of professional scientific research personnel has been increased by 89 percent. The gradual implementation of the party's policy on intellectuals greatly raised the morale of the scientific and technical personnel and accelerated the progress of scientific research. Some key problems in which scientific research for many years failed to make any breakthrough, are now solved one after another, and the fruits of some new achievements are now in popular use. Air stream spinning, self-twisting yarn spinning, the use of jetlooms, shuttleless looms, pile felt machines and other new methods of spinning marked this breakthrough and is now in the stage of application. The science and technology used in remodeling some traditional spinning equipment are now playing their roles in production. Shaped fibers, compound fibers, polypropylene fibers, dyed dacron fibers and other new types of fibers and new processes are already used for mass production. A number of new tasks for energy conservation are about to be accomplished. At the end of 1980, the Ministry of Textile Industry held a meeting to report on scientific and technical achievements in textile industry, and to award prizes for 340 achievements. Among these achievements, 193 items were selected to be popularized in various localities.

6. Fairly good results in the export of textile products. In 1980, there was a lull in the capitalist textile market. Seizing this opportunity, the textile departments in various localities did a great deal of work in striving for more foreign exchange earnings from exports.

First, more products with greater foreign exchange earning power were exported. These products included woolen fabrics, woolen rugs, woolen knitwear, and garments. Export revenues in 1980 exceeded those in 1979 by 24-38 percent. Among cotton fabrics, the proportion of clothes with floral designs, colored cloth and yarn-dyed fabrics has been increased. The Shanghai No 1 Knitwear Mill made a special effort to improve its processing work and produced many garments of novel designs through trimming, inlaid designs and color matching. The output value has been raised a great deal. In 1980, the average output value for each garment was higher than that of 1979 by 24.7 percent. The Tianjin Wool and Linen Company expanded the production of pure wool chiviot and pure wool gabardine and other brand name products, and in

1980, the average procurement price for each meter of woolen fabric was increased by 19.4 percent over that of 1979.

In exports, the rate of up-to-standard goods and fulfillment of contract obligations have all been raised. The companies under the Tianjin Textile Bureau have generally improved their administration over export contracts and set up a system for all contract obligations to be analyzed each month and examined every quarter of the year. If any enterprise had problems in fulfilling their contracts, the company would make the necessary adjustments and help the enterprises find the solutions. In 1980, 95.7 percent of the contract obligations were fulfilled, and this was an unprecedented performance. All exported goods out of Shanghai were delivered on schedule as stipulated in the contracts.

In 1980, the foreign exchange earnings from the export of textile products totaled 32.5 billion dollars, an 11.4 percent increase over 1979.

7. Strengthened market investigations and research in products. To produce easily marketable textile goods and to strengthen their competitive power, the textile industry departments in various localities have extensively held exhibition and sales meetings and conducted investigations and study on market conditions. Such activities were more intensive than in any previous year. In Beijing alone, more than 10 exhibition and sales meetings were held in different market places for the textile products of more than 10 localities. In Jiangsu, Beijing and Hubei, the textile enterprises also joined the Ministry of Foreign Trade in conducting market investigations in Hong Kong and the United States. Trial sales retail departments have been extensively set up in various localities for new textile products by the provinces, municipalities or autonomous regions and sometimes by the prefectures, municipalities or the plants. Some of these trial sales retail departments were also run by the industry departments themselves and the others were run jointly by the industrial and commercial departments. There were also retail departments of a comprehensive or a specialized nature, in addition to many others.

Many provinces and municipalities have adopted the method of linking factories with stores in order to strengthen cooperation between the industrial and commercial departments. In the past 2 years, the Liaoning Provincial Textile Industry Bureau held two meetings each year for both industrial and commercial representatives to get together for the selection of goods and the placing of orders. Raw materials were supplied, production was organized and products were procured, all in accordance with the stipulations of signed contracts. In the past 2 years, the number of enterprises participating in these meetings has continued to increase--up to more than 300--and the number of products for selection at the meetings has doubled--up to more than 7,400. At each meeting, about 30 percent of the products were upgraded. More than 95 percent of the production-sales contracts were fulfilled to full satisfaction.

The exhibition-sales meetings, trial sales retail departments and the meetings for selection of goods and the placing of orders have helped to bring production and sales into closer contact, to promote the development of new products, to enliven production and to enrich market supplies.

8. Preliminary success in the restructuring of economic management. In 1980, the textile sector conducted experiments in the expansion of decision-making power for the enterprises, and approximately 60 percent of all the enterprises participated in the experiment.

Such experiment has brought fresh vitality to the enterprises and positive results have already been gained. From the sharing of profits, the enterprises are now in possession of funds to improve the workers welfare besides developing their own production. According to incomplete statistics, in 1980, work was begun to increase the floorspace of the workers' dormitories by 2.67 million square meters, and 750,000 square meters have already been completed. This was so far the highest increase in any single year. At present, bureaus or companies are serving as the units to retain part of the profits to be used as enterprise funds. Sometimes, the plants serve as these units. Despite the different units used for this purpose, the results have been remarkable. However, there are still some problems which should be solved after summing up the experiences.

Since 1980, the Shanghai Textile Bureau has begun the experiments of retaining part of all profits and of the expansion of decision-making power for the entire trade. It was stipulated that the bureau should serve as the unit to undertake the "three guarantees" for the state, namely the guarantee of a progressive increase rate of output value, guarantee of quotas of profits to be handed over to the state for 5 years, and guarantee of foreign exchange earnings from exports. After meeting these obligations, the bureau would hand over 90.5 percent of the profits to the state and retain 9.5 percent for the enterprises. Remarkable economic results were obtained after 1 year's practice. Compared with 1979, the total output value increased by 11.6 percent, and the profits increased by 17.8 percent in 1980. The profits remitted to the state increased by 16.6 percent even after the repayment of bank loans, and the foreign exchange earnings from export increased by 13.2 percent. Such large increases were unprecedented.

Some provinces and municipalities also set up textile companies on a regional basis, and some of them even began experiments in the integration of industry, commerce and foreign trade. In October 1979, a textile industry company was founded in Shaanxi Province to exercise unified leadership and unified management over its affiliated units in production, administration, finance and party-mass work. This system has helped reduce the number of intermediate links and increased work efficiency.

Main Problems Still Remaining

Despite its many achievements, there still remain some problems in the textile industry. For example:

1. The development of production is still inadequate for people's growing demands. Because of the rapidly increasing social purchasing power in the past 2 years, the people's standard of living has been raised and the pattern of consumption has begun to change. The proportion of commodities for clothing in the total retail sales of consumer goods is now on the rise, and the market for textile products is on the whole satisfactory. However, some products are still in short supply.

2. There are some weak links within the principal trades. In the case of woolen textile, chemical fibers, knitwear and finishing after printing and dyeing, there is a discrepancy between the capacity of equipment and the demand. There are also fairly serious discrepancies between regions and between enterprises. In some old bases and old enterprises, there are still many dangerous buildings and the contaminated water from printing and dyeing needs to be treated. Workers' dormitory and warehouses are universally insufficient.

3. There is still certain rash action and the tendency toward dispersal in capital construction. In some regions, small textile factories, especially the commune- and production brigade-run enterprises, are being set up rashly. Their product quality is poor, and their consumption of raw materials and energy is high. They are squeezing raw materials and energy out of the large mills.

The textile industrial sector should further implement the policy of readjustment, curtail the scale of capital construction, promote science and technology, strengthen business management, increase production, improve the quality, add more varieties and strive for better economic results. They should produce more textile products to meet the needs of the urban and rural population, and make greater contributions to state's accumulation funds and foreign exchange earnings.

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ACHIEVEMENTS IN PETROLEUM INDUSTRY DETAILED

Beijing 1981 ZHONGGUO JINGJI NIANJIAN [1981 ALMANAC OF CHINA'S ECONOMY] in Chinese pp IV 57-60

[Article by Investigation and Research Office of the Ministry of Petroleum Industry: "China's Petroleum Industry"]

[Text] The petroleum industry is one of our main energy industries. In 1980, the production of crude oil was 105.95 million tons (Taiwan Province not included; same as follows), the sixth highest in the world; and the production of natural gas was 14.27 billion cubic meters, the 13th highest in the world. In our country, petroleum and natural gas combined to form 26.8 percent of the total amount of primary energy. The development of petroleum industry marks an important achievement of our people in socialist construction under the leadership of the party and the government.

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In 1949, when New China was born, there were in our country only three oilfields--the Laojunmiao Oilfield of Yumen, Gansu; the Dushanzi Oilfield of Xinjiang; and the Yanchang Oilfield of Shaanxi--and two gasfields--the Shengdengshan and the Shiyougou gasfields in Sichuan; and two shale oil plants in Liaoning--with a total annual output of 120,000 tons of crude oil. At that time, China had only several drills for wells of medium depth, and the annual drilling footage was not more than 4,500 meters. The foundation was very weak.

After liberation, the Ministry of Geology did a great deal of work in general geological surveys in order to develop our petroleum industry. During the period of national economic recovery and the First Five-Year Plan, the petroleum departments resumed and expanded the production of the former oilfields besides proceeding with the work of prospecting and exploiting oil resources in the northwestern regions. Thus the Karamay Oilfield in Xinjiang and the Lenghu Oilfield in Qinghai were discovered and exploited. During the First Five-Year Plan, the average progressive increase rate for the output of crude oil each year was 27.1 percent. In 1957, the crude oil output reached 1.46 million tons and that of natural gas reached 70 million cubic meters. During the Second Five-Year Plan, zone prospecting began in several large basins in the Northeast, Northern China, and the Southwest. In 1959, an oil seam of industrial value was discovered in the sedimentary rocks of continental facies in the Song-Liao Basin in the Northeast. In 1960, the Daqing mass battle for oil was organized, and in only 2 or 3 years, the oil deposit was determined and exploitation began. Our national oil output was increased by a wide margin and reached 6.48 million tons in 1963. In December of the same year, Premier Zhou Enlai solemnly announced before the Fourth Session of the Second NPC that China had become basically self-sufficient in petroleum. Gone forever were the days when Chinese people had to use "foreign oil." The prospecting and exploitation of the Daqing Oilfield not only removed the label of "an oil poor country" but also enabled us to apply the dialectical materialist concept in developing our oil industry, including analyzing and studying various contradictions on the basis of actual underground conditions of the oilfield, formulating plans for the exploitation, solving the technical problems in geology and oil extraction, cultivating the workstyle of "three honests and four stricts," and enforcing the system of job responsibilities in addition to other good experiences.

Beginning from 1964, the focus of prospecting shifted to the Bohai Bay basin; and the Shengli Oilfield in Shandong, the Dagang Oilfield in Tianjin, the Liaohe Oilfield in Liaoning and the Jizhong Oilfield in Hebei were discovered and built one after another. At the same time, a number of new oilfields were discovered in Jiangsu, Henan, Hubei, and the Shaanxi-Gansu-Ningxia border region. The output of crude oil reached 104.05 million tons in 1978, and 106,15 million tons in 1979. China thus became one of the principal oil producing countries. Besides catering to domestic needs, our crude oil was also exported to some countries. In the 30 years from 1950 to 1979, our oil output was increased at an average annual progressive rate of 25.3 percent, quite a high growth speed. By the end of 1979, oil-gasfields had been discovered in 19 provinces, municipalities and autonomous regions, and 122 of them are already in operation. By now, 15 oil and natural gas production bases have been established in Daqing, Jilin, Liaohe, Jizhong, Dagang, Shengli, Henan, Jianghan, Jiangsu, Xinjiang, Qinghai, Yumen, Cangqing, Yangchang and Sichuan. The conditions of our several main oil and gas zones are now as follows:

Daqing Oil Zone is located in the central part of the Song-Nen Plain in Heilongjiang Province. Geologically, its oil pool is within the dome anticlinal structure of the Cretaceous System. The exploitation began in May 1960 and by now, three oilfields are in operation with a total area of 1,022.4 square kilometers. By the end of 1980, 7,000 wells had been drilled. For 5 years beginning from 1976, there had been a steady and continuous output of 50 million tons. After the exploitation of the oilfield, the method of "early period internal water injection" was used to preserve the pressure of the oil reservoir. The crude oil of Daqing is of the light paraffin base type with 20-30 percent paraffin content. The solidification point is between 20-30 degrees Centigrade; the viscosity is 10-11 centipoise; and the sulphur content is less than 1/1,000. Now there is a fairly complete system of production, scientific research, education and daily life service in the Daqing Oil Zone. It is now the largest oil production base in our country as well as one of the largest oilfields in the world.

The Shengli Oil Zone is located in northern Shandong Plain on both banks of the Huanghe River near its entrance to the sea. Exploitation began step by step in 1965 and by now, 23 oilfields including the Shunhua and the Pingfangwang Oilfields are in operation. The output in 1980 reached 17.58 million tons. The oil in

Shengli Oil Zone is mainly from the oil-bearing sandstones of the Third System, and the oil pools are mostly of the anticlinal and fault block type.

Jizhong Oil Zone is located in the northern part of the Northern China Plain. The oil is mainly from carbonate rocks of the Sinian System and most of the deposits are in the pools of ancient buried hills. Exploitation began in 1976 and by now, there are the Renziu, Yanling and 12 other oilfields in operation. The area is 114.8 square kilometers, and in 1980, the output reached 16,026,000 tons. The discovery of the ancient buried hill oilfields created a new sphere for our oil prospecting.

The Liaohe Oil Zone is located in the northeast of Liaodong Bay. The main oil-bearing layer is of sandstones of the Third System, and the main oil pools are of the anticlinal structure and fault block type. Since the oil was obtained from the first high-yielding well in the middle of the fracture structure in Xinglongtai in July 1969, nine oilfields have been discovered and exploited. The total area is 174.5 square kilometers, and the oil output in 1980 was 5,091,000 tons. The oil/gas pools in this oilfield are of many types, and the distribution of oil, gas and water is rather complicated. In recent years, some comprehensive measures of adjustment have been adopted in accordance with the characteristics of the oil-field to improve the conditions of exploitation.

The Dagang Oil Zone is located south of Tianjin at the estuary of Haihe River. By the end of 1965, the Dagang Oilfield was discovered in the strata of the Third System. Since the, Yangsanmu, Yangerzhuang and seven other oilfields were discovered with a total area of 150.5 square kilometers. Many of the oilfields have high viscosity and are thick with a lot of sand contents. The output of crude oil in 1980 was 2,908,000 tons.

In the Karamay Oil Zone of Xinjiang, the Karamay Oilfield was discovered in 1955. By now, three oilfields including the Karamay and the Dushanzi have been built. The oil layers in the Karamay Oilfield are mainly from the oil-bearing sand stones of the Triassic System and is unicline and fracture sealed. In the course of exploitation, the technique of "early period water injection and selective transformation" was used so that the output of crude oil can steadily increase. In 1980, the output was 3,905,000 tons.

The Sichuan oil-gas zone includes the sedimentary basin with an area of 230,000 square kilometers in Sichuan Province and part of Western Hubei. Drilling explorations began in 1953, and by now 59 gas fields and 11 oilfields have been verified. Among them, 53 gasfields have been exploited and have produced 6.3 billion cubic meters of gas in 1980. In the Sichuan Basin, there are 10 oil- and gas-bearing layers of the Sinian and Jurassic Systems. The reservoir rocks are mainly of the fissure type. By conducting deep well explorations in recent years, good experiences have been gained from seismic prospecting, large-scale acidifying fracture and other measures for raising the output.

In addition, the Ministry of Petroleum Industry and the Ministry of Geology have carried out geophysical prospecting and deep drilling on the continental shelf along the coast. In Bohai Sea Area, 95 exploratory wells have been sunk and oil has been found in 22 of them. By now, three platforms have been built for oil extraction. In Beibu Bay of Nanhai Sea, in Yingge Sea, and in the sea area off the mouth of Jujiang River, 17 exploratory wells have been sunk and oil has been found in eight of them. Prospecting is also going on in the Donghai Sea area.

Along with the continued increase of output, our oil refining industry has also made fairly great progress. When New China was born, there were only several small refineries in Yumen of Gansu and in Liaoning with very little processing capacity. We had to rely mainly on export for petroleum products. After the founding of the People's Republic, the former refineries were quickly reactivated, and after being rebuilt and expanded, their processing capacity has been greatly increased. However, they could only produce diesel oil, gasoline, petroleum and small quantities of lubricants, altogether totaling 38 types. In 1958, trial production began in Lanzhou Oil Refinery, the first refinery with a fairly high processing capacity. In 1963, the Daqing Oil Refinery, the first one designed and built, and with its equipment made in China, began its operation. In the 1960's, we had basically mastered some advanced oil refining techniques of the world standards, such as catalytic cracking, platforming, delayed coking, catalysis, additives and other new technology. The varieties of products were increased and the quality of products improved. Petroleum products can now find their foothold in our own country and have become self-sufficient. In the 1970's, some new refining techniques, such as catalytic cracking in elevating towers, multi-metallic reforming, platreating and molecular sieve dewaxing were gradually developed. Construction of refining plants was also stepped up. Among the refinery plants built in 21 provinces, municipalities and autonomous regions, 33 of them are capable of processing more than 50 tons and producing 687 different petroleum products. The processing capacity, the varieties of products and their quality and quantities are basically adequate for the needs for socialist construction, and some of these products have already entered the world market. At present, the conditions of some of our principal refinery plants are as follows:

Lanzhou Oil Refinery: Completed and commissioned in 1958. This is a comprehensive oil-refinery enterprise producing fuel, lubricants, catalysis, additives, equipment and instruments and meters, now having 52 sets of production equipment. In 1980, it produced 109 varieties of petrochemical industrial products and was rated by the Ministry of Petroleum Industry as an advanced unit in quality and energy conservation among all oil-refinery enterprises in the country.

Changling Oil Refinery: Completed and commissioned in 1970. This plant produces fuel and catalysis, and has nine sets of production equipment. In 1980, it produced 25 varieties of petrochemical industrial products and was rated by the Ministry of Petroleum Industry as an advanced unit in energy conservation, environmental protection and education for its workers and staff members, besides producing fine-quality goods.

Shanghai Oil Refinery: Only for oil storage before liberation, but rebuilt after liberation into an oil refinery. It produces fuel and lubricants, and has 22 sets of production equipment. In 1980, it produced 79 varieties of petroleum products and was rated by the Ministry of the Petroleum Industry as an advanced unit in energy conservation and business management besides producing fine-quality goods.

Daqing General Petrochemical Industrial Plant: Completed and commissioned in 1963. It is a comprehensive oil refining enterprise producing fuel, lubricants, chemical industrial products and chemical fertilizers. In 1980, it produced 38 varieties of petrochemical industrial products and was rated by the Ministry of Petroleum Industry as an advanced unit for its fine-quality products.

In 1950, the Seventh Petroleum Plant was able to process only 49,000 tons of crude oil. After gradual expansion, it is now capable of processing more than 5 million tons. It is a fuel-lubricant-oil refinery. In 1980, it produced 84 varieties of petroleum products, was one of the main factories exporting finished petroleum products, and was rated by the Ministry of Petroleum Industry as an advanced unit among all oil refineries in the country.

The Dongfanghong Oil Refinery under the Yanshan Petrochemical Industry Company in Beijing was completed and commissioned in 1969. It is a fuel-lubricant refinery and has 15 sets of production equipment. In 1980, it produced 40 varieties of petroleum products and was rated by the Ministry of Petroleum Industry as an advanced unit in environmental protection.

Output of Oil and Natural Gas

Years	Average Crude Oil Output (10,000 tons)	Average Natural Gas Output (0.1 billion cubic meters)	Average Crude Oil Processing (10,000 tons)	Product Varieties Processed
Recovery Period 1950-52	32	0.06	38	38
1st 5-yr plan 1953-57	100	0.28	124	140
2nd 5-yr plan 1958-62	445	8.24	428	416
Readjustment Period 1953-65	876	10.60	834	494
3rd 5-yr plan 1966-70	1936	18.08	1760	577
4th 5-yr plan 1971-75	5612	61.88	4176	636
1976	8716	101.00	5771	642
1977	9364	121.23	6310	648
1978	10405	137.34	7070	656
1979	10615	145.15	7146	668
1980	10595	142.76	7538	687

Work on long-distance pipelines was actively carried out along with the development of the petroleum industry. By the end of 1979, 2,746 kilometers of pipelines had been laid and an oil transportation network was basically formed in the Northeast and Northern China areas. Crude oil from Dawing, Jizhong, Dagang, Shengli and Liaohe could now be transported directly to the harbors or the oil refineries. In 1979, pipeline transportation accounted for 61.2 percent of the total volume of crude oil transportation throughout the country.

Great progress has been made in petroleum science and technology. After 30 years' efforts, we have accumulated the experiences and mastered the methods for a system of comprehensive oil and gas prospecting and thereby enriched the geological theories of oil formation in the sedimentary basins of continental facies and the formation of oil-gasfields in sedimentary facies. We have achieved good results in studying the theory of ancient buried hill oilfields and fault block oilfields. After setting up a comprehensive system of geophysical exploration with gravity, magnetic, electrical and seismic methods and adopting the digital methods and the use of digital seismographs, we have greatly increased the accuracy of seismic prospecting. We are beginning to apply the theories of seismic-stratigraphy in our research in lithology and lithofacies, and have successfully manufactured a number of geophysical logging instruments for the mining areas. We have basically set up a logging system for sand and mudstones and have an initial grasp of the technology of digital treatment in the process of developing digitalization and serialization. In well-drilling, we have popularized the use of jet drills, high-efficiency drills, fine-quality mud and other advanced techniques and increased both the speed and the quality of drilling work. We are now fairly familiar with the technique of sinking 3,000-meter deep wells and have already sunk eight 6,000-7,000 meter extra-deep wells. We have also acquired a preliminary knowledge of sinking off-shore wells and cutting inclined shafts. In exploiting oilfields, we have devised the technique of injecting water to maintain the pressure between layers and to make up for the quantity of extracted oil; and that of selective extraction. These techniques are now in popular use and being further developed. We are now beginning to use a series of oil pool engineering methods mainly aiming at a higher extraction rate and a prolonged and steady oil supply, and suitable for the characteristics of our oilfields. The geological study and the techniques of oil extraction used in the Daqing Oilfield are all fairly advanced. In oil refining, after mastering the techniques of the 1960's, we have actively developed the technology of oil refining that is suitable for our national economy, and successfully produced, after research, a number of sophisticated petroleum products for national defense and to be used on complete sets of imported equipment; used a number of high-efficiency oil refinery mechanical equipment; experimented with electronic computerized control of the distilling equipment with constant pressure reduction; and formed a set of quality instruments and meters. The storage and transportation departments of some oil refineries are now operated through telemetering, remote control, remote communication and electronic computer control. Some new techniques have also been adopted in contaminated water treatment and noise control. In the course of scientific research and production, a contingent of research workers and technicians is being formed to tackle difficult scientific and technological problems. We have a fairly complete petroleum scientific research organ of a high level, including 29 key scientific research institutes and six experimental bases, all equipped with fairly advanced means of scientific research.

A number of intermediate experimental equipment and the equipment for experiment with models have also been set up.

Education in petroleum has shown great achievements. Before liberation, there was not even one petroleum college; and it was not until after the founding of the People's Republic that petroleum as a special course was included in the curriculum. After 30 years' construction, we have set up five petroleum colleges, one each in Eastern China, Southwest, Daqing, Jianghan and Fushun, with 36 special courses and an enrollment of 7,383 students. So far, a total of 23,000 students have graduated. There are now 25 secondary petroleum vocational schools with 122 special courses in the country with 15,000 students. A total of 87,000 students have graduated from these schools. The petroleum enterprises have also set up 18 workers universities and 92 classes in the TV University with more than 5,800 students.

After 30 years of construction, China's petroleum industry has a fairly high standard in prospecting, exploitation, crude oil processing, machinery manufacturing, oilfield and pipeline construction, scientific research and designing. There is also a fairly strong contingent of professional petroleum workers. In the past 30 years, the profits handed over and the taxes paid to the state from the petroleum industry were more than three times the amount of state investment in the same period. In 1979, every 100 yuan invested brought about 60 yuan's profit, and for every 100 yuan's output value, the circulating fund used was only 16.8 yuan.

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In 1980, the policy of national economic readjustment was fairly well implemented in the petroleum industry.

The exploitation of oilfields and new zones and the commissioning of them were all carried out in an orderly way, and the output has been fairly steady. A comprehensive readjustment was carried out in the 22 zones of some old oilfields, such as Daqing, Jizhong, Dagang Liaohe and Karamay. Positive measures were adopted to increase the output and to slow down the rate of its progressive decrease. The total crude oil output was 105.95 million tons, and the state plan was overfulfilled by 0.3 percent. The output of natural gas was 14.27 billion cubic meters, and the state plan was overfulfilled by 4.2 percent. In the same year, a total of 13,309,000 tons of crude oil and 4.2 million tons of petroleum products were exported.

Continued efforts are being made in prospecting for oil and natural gas in the east where geological conditions are rather complex. At the same time, prospecting, mainly seismic prospecting, is being strengthened in several large basins in the west. In the east, more than 400 wells have been discovered with oil seams of industrial value. Exploitation later proved the presence of a number of oil-gas zones. We have also gained a better knowledge of the geological conditions of the several basins in the west; and in the regions where oil has already been found, the oil reservoirs have been further expanded. We have also cooperated with foreign petroleum companies in off-shore prospecting. In the sea areas of Nanhai and Nanhuanghai totaling 430,000 square kilometers, we have carried out geophysical prospecting and covered 110,000 kilometers of a seismic survey line. We have also signed contracts with the oil companies of Japan and France for joint prospecting and exploitation in some sea areas in Bohai and Beibu Bay.

To meet the requirements of national economy, the oil refinery enterprises have readjusted their plans of production with particular stress on a higher rate of extraction, higher quality and lower consumption; and have fulfilled the production plans in an all-round way. The outputs of gasoline, lubricant oils, commercial fuel, light oil for chemical industry, paraffin wax and bitumen were increased by a wide margin over 1979. Among these products, the output of light oil for chemical industry increased by 41.5 percent. The comprehensive marketable rate of petroleum products reached 91.8 percent, and the output of petroleum products was increased by 0.95 million tons. Among the products of the principal oil refineries were aviation gasoline, gasoline for lighting, vehicle gasoline, refined wax, all-purpose diesel oil, bitumen and naphtha, totaling 88 different items. Their quality was up to or close to the international standards, and 10 of these products won national gold medals, silver medals or citations.

While striving to increase their output, the oil enterprises are also taking positive measures to reduce energy consumption. Many oilfields have adopted such measures as transporting oil without raising its temperature, recovery of light oil, treatment of contaminated water which contains oil, or injection of this water into the ground, remodeling the boilers for burning coal instead of oil, and so forth. As a result, the comprehensive consumption of oil in the oilfields was lower than the previous year by 0.6 percent. The marketable rate of crude oil under unified state control was up to 95.1 percent, and these enterprises were able to increase their supply of marketable oil to the state by 1 million tons. These oil refineries also remodeled 16 sets of equipment and adopted a series of other measures for energy conservation, such as adjustment of temperature in the network of tubings, the process of temperature change, recovery of residual heat, remodeling heating stoves, raising the heat effects of blast furnaces, readjustment of the machinery pumps and so forth, resulting in the reduction of comprehensive consumption for oil refining by 10.58 percent. In 1980, the volume of processing work increased by 5 percent, but the total energy consumption, instead of increasing, actually decreased by 6 percent. Improved techniques were used for oil transportation through pipelines, such as rational operation, transportation with adding or reducing heat, and so forth, so that energy consumption in the transportation of oil through pipelines could be reduced by more than 4 percent. In the whole year, the enterprises saved 0.96 million tons of crude oil and fuel, 0.3 billion kwh of electricity, and 26,000 tons of finished petroleum products.

In petroleum scientific research, as a result of strengthened and well planned administration and greater attention to results, a total of 46 research projects were completed in 1980, and many of these projects were urgently needed in production. Their application in production later produced outstanding economic results. For example, the Pipeline Bureau of the Ministry of Petroleum Industry manufactured a foam-plastic pipe-cleaner and solved the serious problem of wax formation which may cause the deformation of pipelines. When this cleaner was used on the pipelines in the Northeast, the volume of oil transportation each year was increased from 37 million tons to 40.3 million tons. The Petrochemical Industrial Research Institute carried out study on cataclytic cracking of residues under constant pressure and the use of metal inhibitor. After industrial experiment, it was found to be capable of solving the problem of raw materials with insufficient catalytic cracking and raising the recovery rate of light oil by approximately 6 percent.

Used on an equipment that can process 0.12 million tons of crude oil, it can help save some 2 million yuan a year. The carbon monoxide combustion supporting agent popularized by the Shanghai Oil Refinery and other enterprises can help save more than 80,000 tons of diesel oil each year which means an increased income of more than 19 million yuan. In 1980, the Ministry of Petroleum Industry examined the results of 64 research projects and conferred national awards for invention on 12 of them. Four of them won the second class awards; another four, the third class awards; and the remaining four, the fourth class awards. The chain driven centrifugal oil pump manufactured by the Drilling and Extraction Technique Research Academy of the Shengli Oilfield, one of the second class award winners was an innovation in the use of well-balanced rotating assemblies. It has long strokes, high capacity, light weight, good dynamic balance and low electrical consumption. Compared with a piston pump put to the same use, it can save more than 40,000 kwh of electricity each year.

In 1980, the petroleum enterprises further strengthened their economic management with stress on the increase of output and revenue and reduction of consumption and other expenditures and obtained satisfactory results. There were 15 oil refineries and three machinery plants participating in the experiment of decision-making power. On the basis of "responsibility for tasks and production costs, sharing of profits from above-quota production and practice of economy, and receiving rewards according to the percentage of workpoints," all the oilfields further improved their methods of business management, set up the system of internal economic accounting, and strict economic responsibilities, improved the methods of awarding bonuses and achieved better economic results.

The main problems in the petroleum industry at present are the insufficiency of verified reserves, the imbalance between reserves and outputs, the progressive decrease of outputs in the old oilfields, and the difficulty to maintain the present level of production. These problems were mainly caused by the higher rate of increase in the output of crude oil than the rate of increase in the reserve amount during the 10 years of turmoil. Another cause is that since 1976, zone prospecting has been insufficient and no new breakthrough has been made. If we have to maintain an output growth, we must have to increase the burden of the old oilfields.

In accordance with the policy of national economic readjustment and the state's energy policy, the petroleum industry has duly readjusted the output of crude oil during the period of readjustment, strengthened prospecting, gradually increased the reserves, and improved the ratio between reserve and extraction as a preparation for future development. Experiences in oil prospecting and exploitation in the past 30 years and the present conditions of the petroleum industry have shown that if the goal of readjustment in the petroleum industry is attained, there will be good prospects for its future development.

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COAL INDUSTRY SEES TECHNICAL ADVANCES, INCREASED OUTPUT

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[Article by Investigations and Study Section of the Staff Office of the Ministry of Coal Industry: "China's Coal Industry"]

[Text] General Conditions of Development

Coal is the main energy source in our country. Since the founding of the People's Republic, coal has for a long time amounted to about 70 percent in the composition of our consumer goods. Coal industry has become one of our important industrial branches.

China has rich coal reserves with a fairly complete assortment of products. The deposit has been varified to be more than 600 billion tons. More than half of the 2,000 counties (municipalities) in the country are known to have coal deposits, and in the province of Shanxi, the known reserves is more than 200 billion tons.

The party and the state have attached great importance to the development of coal industry. Since the founding of the People's Republic, the state has invested a total of 44.93 billion yuan in capital construction for the coal industry, and the average annual productive capacity of the newly completed and commissioned mines each year is 11.87 million tons. At the same time, potential tapping and technical renovation and transformation have been selectively carried out on old mines, while local coal mines are actively developed in order to increase their outputs rapidly. Coal output in 1949 was only 32.43 million tons; in 1957, after the 3 years of recovery and the First Five-Year Plan, it was increased to 130.73 million tons. Despite certain subsequent setbacks, development has been on the whole rapid. After smashing the "gang of four," the output in 1977 was more than 500 million tons; and from 1978 to 1980, it was always above 600 million tons. The average annual increase rate was 10 percent from 1949 to 1980.

After 31 years' construction, our coal industry has been raised to a fairly high standard. There are now more than 2,200 coal mines operated at the county or higher levels with 4.19 million workers. The coal from 580 of these mines is distributed by the state according to a unified plan, and their designed capacity is more than 290 million tons. There are 1,634 coal mines operated by the provinces, prefectures and counties with a total productive capacity of 180 million tons each year. The number of mines with an annual output of 5 million tons or more has been increased to 26, and 10 of them are producing more than 10 million tons each. The annual coal output in Kailuan and Datong regions has now exceeded 20 million tons. Washing and assortment of coal has also made considerable progress. A total of 176 coal washing plants have been newly built, and the present washing capacity has reached 100 million tons. The building of a number of new mining sites, mining shafts and coal washing plants is also being speeded up.

Technology in the coal industry has also developed a great deal along with the development of production. The backward mode of production with manual labor and pack mules of the old society is no longer used in coal mining which has now been mechanized or semimechanized. We are now in possession of more than 1,200 sets of coal extraction units and 223 sets of imported or home-made multi-purpose mechanized coal mining equipment. The technology of coal-mining in our country also continues to improve. Advanced mining methods are being gradually popularized; the layout of mining shafts has become more rational; and the standard of technical equipment has been raised. The single longwall coal mining method has been popularized for sloping or mildly sloping thin and medium coal seams, and some mines have successfully used the "pulling from opposite sides" method and the sloping longwall method. For thick sloping or mildly sloping coal seams, the slanting layer-by-layer method and the method of filling in water and sands are mostly used. For coal seams in the form of sharp slopes, the method of horizontal layers with lagged stulls, sublevel stopes, or small stopes with supporting pillars are commonly used. Mining with hydropower has also been developed to a certain extent. At present, among the mines under state control, 86.74 percent of them are using the longwall method, while 4.58 percent of them use the methods of horizontal layers, supporting pillars, sublevel stopes, and hydropower methods.

The technical level and equipment of the capital construction for our coal mines have continued to improve while the construction force has grown strong. The technology of shaft building is also making fairly rapid progress, and a mechanized construction line has been adopted in excavation. Other special methods have also made progress to varying extents. Since the founding of the People's Republic, the freezing method, well-drilling method, tenting [weimu 1602 1612] method, well sinking method and the technique of dewatering with pre-grouting have been successfully employed in making more than 300 pit shafts. In the past several years, remarkable progress were made in the technique of well-drilling and large drills have been used in making 21 pit shafts with a maximum diameter of 7.9 meters and a maximum depth of 308 meters. For tunneling, a number of machines for rock shoveling, lifting, loading and transporting have been successfully manufactured, and a few complete sets of equipment have been imported. Underground excavation and loading have been 80 percent mechanized.

To meet the requirements of the developing coal industry, the coal departments have set up facilities for geological, designing and scientific research in addition to organizing the professional forces.

In China, there are now 24 oilfield-geology companies and 125 geological prospecting teams. The present methods of prospecting are drilling and physical exploration.

In regions where conditions are favorable, both methods can be used in combination. We are now developing modern prospecting techniques by manufacturing digital seismographs and remodeling the drilling equipment.

We have already established 30 coal mine design institutes including eight key institutes. They are capable of designing for coal mines of different capacities and for coal assorting plants. The use of electronic computers for designing has also started.

There are now 31 coal mining scientific research institutes engaged in geological prospecting of oilfields, mining, tunneling, mining safety, coal assorting, coal mining machinery, coal chemistry and other scientific research projects.

We have now 12 institutes of higher learning, 36 secondary technical schools, and 102 technical schools for training technical personnel in the coal industry. Since the founding of the People's Republic, 120,000 students have graduated from these institutes of higher learning and secondary vocational schools.

The vigorous development of our coal industry is an eloquent proof of the superiority of socialism. Were it not for the 10 years of catastrophy and the influence of the "leftist" mistakes, there can be no doubt that our achievement would have been far greater and our progress much faster.

Consolidation and Development of Coal Industry in the Process of Readjustment in 1980

The prolonged interference and sabotage by Lin Biao and the "gang of four" during the 10 years of "Cultural Revolution" and the influence of "leftist" mistakes have brought about an imbalance within the coal industry. In some mines, mining and tunneling are seriously out of proportion, and a lot of work in making up certain missing links, safety engineering and housing for the workers and staff members has long been overdue, resulting in great difficulties for the development of the coal industry.

In 1980, our coal industry departments implemented the policy of readjustment as the central task and acted in accordance with the spirit of "not only recognizing the need for coal in the process of national economic readjustment, but also carrying out readjustment in the coal industry itself." The progress of readjustment has been accelerated and various tasks of construction for coal production have been fairly satisfactorily completed.

(1) Coal output has been steadily maintained at the amount of 600 million tons and the readjustment of production mines is making progress.

Coal output. In 1980, the national output was 620,130,000 tons, being 3.9 percent above state plan, but 2.4 percent below the output of 1979. This was necessary as well as advantageous to the readjustment of internal proportionate relationship of the coal mines. Although the actual output was less than in the previous year, a steady increase of 600 million tons and a fairly high output was maintained.

The output included 344.39 million tons produced by state controlled mines, or 0.7 percent above the state plan and 3.7 percent below that of 1979.

The output of local coal mines was 275.74 million tons, or 8.2 percent above state plan and 0.7 percent below that of 1979. This included 162.12 million tons produced by province-, prefecture- and county-operated mines, or 9.33 million tons less than in 1979; and 113.62 million tons produced by commune- and production brigade-run mines, or 7.31 million tons above that of 1979.

The coal departments produced 58.66 million tons of fine washed coal, including 50.75 million tons from state controlled mines or 1.2 million tons above the plan; and 34.7 percent of the coal, an increase of 1.9 percent over that of the previous year, had been washed.

The state controlled mines produced 23.63 million tons of torbanite, including 7.87 million tons of anthracite and 2.03 million tons of lignite.

The state-distributed coal is classified according to its brands as follows: anthracite, 39.5 million tons; lignite, 11.99 million tons; bituminous, 292.9 million tons including coking coal (or coking, fat, gaseous and lean coal), 213.24 million tons.

Conditions of coal mine readjustment. Since the guiding thought with readjustment as the core for coal mines in the country is fairly clear, the work carried out was rather practical; and readjustment and consolidation in 1980 made fairly good progress.

To readjust the relationship between mining and tunneling, great efforts were made for development tunneling and stripping in opencut mines. The planned footage of development tunneling was 840,000 meters and 946,000 meters were completed. According to statistics on the 96 mines where mining and tunneling are out of balance, a total footage of 898,000 meters should be completed according to the requirements of readjusted engineering work. The 167,000 meters completed in 1979 and 253,000 meters in 1980 enabled 36 mines to restore the basically balanced relationship between mining and tunneling (in 1969, this relationship was restored in six mines). In five opencut mines where the relationship between mining and stripping had been out of balance, 14.3 million out of a shortfall of 63.6 million cubic meters of stripping were made up in 1980.

After investigations and study, preliminary plans were worked out for readjusting the imbalance in extraction from thin and thick seams. In 33 mining administration bureaus, including those in Kailuan, Zaozhuang and Jiaozuo, extraction from thin seams was increased in 1979.

There was a breakthrough in raising the quality of coal and in increasing the capacity for coal washing and sorting. The average ash content of marketable coal from state controlled mines was 21.58 percent, being 1.27 percent lower than the planned 22.85 percent. The average gangue content of marketable coal was 0.51 percent, being 0.24 percent lower than the planned 0.75 percent, and lower than the best level of 0.62 percent ever attained. The average amount of dust from washed coal was 10.27 percent, being 0.08 percent below the planned 10.35 percent.

This had been the best level since 1973. The quality of products from 24 coal washing plants were improved, and the product mix of 43 plants was readjusted to provide greater varieties. The average water content of washed coal was 12.03 percent, the best level since 1971. In 1980, 116 washing and sorting projects were planned for production, and 73 of them were completed in the same year, increasing the capacity of coal washing by 8.1 million tons and that of screening by 3,75 million tons.

All coal mines paid close attention to the consolidation of basic work and stressed safety in production by conducting preventive examinations and repairs. The rate of casualties, breakdown of electrical equipment, and run-down tunnels was lowered. The safety factor has markedly improved. Among the state controlled mines, 39 of them measured up to the required standards of civilized and safe production.

In the course of readjustment, a number of models in completing unfinished jobs and striving for increased production have emerged. Through conscientious implementation of the readjustment policy, the Hegang Mining Administration Bureau in Heilongjiang strengthened the basic work and then gradually improved the situation of imbalance. The coal output steadily increased. In 1980, the coal output was 12.73 million tons, being 1.13 million tons above the planned output. It was the bureau with the highest above quota output. The Pingdingshan Mining Administration Bureau, which had serious problems with imbalance, did not relax its efforts in production while paying great attention to readjustment. Thus, in addition to speeding up the progress of readjustment, it also managed to maintain a constant output increase by more than 13.6 million tons. The Xieyi Mine in Huainan of Anhui, after 2 years' efforts, succeeded in readjusting the imbalance between extraction and tunneling, and in 1980, produced 1.55 million tons of coal, which was 0.24 million and 0.15 million tons more than the outputs of 1978 and 1979 respectively. The mining administration bureaus of Huaibei in Anhui, Datong in Shanxi, and Zubo in Shandong also had satisfactory results.

Fulfillment of economic indices by state controlled mines (see Tables 1, 2, 3 and 4 for details)

Table 1. Makeup of Coal Extraction Output in State Controlled Coal Mines in 1980

Category		Extraction Output (%)
Classified according to thickness of coal seams	less than 1.3 meters	12.60
	1.3 - 3.5 meters	44.21
	more than 3.5 meters	43.19
Classified according to gradient	< 12°	47.87
	12° - 25°	36.29
	25° - 45°	10.59
	> 45°	5.25

Table 2. Stope Indices of State Controlled Mines in 1980

	Items	Unit	Quantity
Average Stope	Number	Units	2167
	Length	Meters/Unit	95
	Monthly Footage	Meter	39.3
	Monthly Output	Ton/Unit.Month	11032
Coal seam productivity		Ton/Unit.Month	2.95
Total Extraction Output		10,000 tons	28687

Table 3. Tunneling Face Indices of State Controlled Mines in 1980

Tunnel	Average Number	Average Monthly Footage (meter/number.month)
Total	5269	107.9
Coal	1744	154.6
Coal/Rock	1381	121.9
Rock	2144	60.9

Table 4. Relevant Economic and Technical Indices of State Controlled Mines in 1980

	Item		Units	Indices
Efficiency	Entire personnel		Ton/worker	0.912
	Extraction crew		Ton/worker	4.129
	Tunneling crew		Meter/worker	0.125
Coal Quality	Marketable coal	Dust content	%	21.58
		Gangue content	%	0.51
	Washed Coal	Extraction rate	%	56.16
		Dust content	%	10.27
		Water content	%	12.03

(2) Safety measures in coal mining has been strengthened and safety conditions are improving.

Since production in most of our coal mines is carried out by miners, and the geological structures in most of these mines are complex, the element of risk is naturally high.

In 1980, coal mines throughout the country upheld the principle of "Safety First," while attending to the jobs of readjustment and administration. Safety conditions are now improved. Compared with the previous year, the number of fatal casualties dropped by 20.58 percent. The drop was 32.31 percent in state controlled mines and 20 percent in capital construction units. The rate of fatal casualties for every million tons was the lowest in 7 or 8 years; for the state controlled mines, this has been the lowest rate ever attained. Compared with 1979, among the state controlled mines, the number of fatal casualties had dropped in 81 percent of the bureaus (mines), and 52 mines had no fatal casualty throughout the year.

The number of accidents was reduced. Caving in among all mines in the country dropped by 23.2 percent; transportation accidents dropped by 13.0 percent; gas accidents dropped by 31.8 percent, and accidents involving electrical equipment dropped by 12.7 percent.

Coal mines throughout the country carefully carried out readjustments for safety in production in the following ways:

Repeated stresses on "Safety First" as an ideological education. The leading cadres at various levels has an overall responsibility for safety, while the Ministry and many provincial bureaus set up a system of meetings for discussing safety measures.

In February, the Ministry of Coal Industry issued the "Safety Regulations for Coal Mines." Classes were held at various levels from the Ministry to various provincial coal industry bureaus, mining administration bureaus, and the mines to study the "Regulations." These classes were attended by 158,000 workers and staff members. All units were guided by the "Regulations" in their inspections and readjustments in strengthening safety management in order to provide safer working conditions.

All coal mines in the country have listed 332 items of safety measures for which 93.65 million yuan has been invested. By the end of 1980, 165 items were completed. Some provinces, municipalities and autonomous regions have strengthened their work of consolidation and readjustment among various local coal mines and improved the conditions for safe operation in some mines.

May was designated a "safety Month" followed by the "100-day Safe Production" (without fatal accident) emulation activities and a major autumn safety inspection. Among the state controlled coal mines, 175 achieved a "100-day Safe Production" record, and 71 of them achieved such record three times in succession. In Linxi Mine of Kailuan has 400 consecutive days of accident-free production. In August and September, the Ministry of Coal Industry and the Coal Miners Union organized propaganda teams to disseminate advanced experiences in safe production in some coal mines.

Supervisory organs for safety were strengthened to exercise more active supervision. The establishment of safety supervisory bureaus in 11 provinces (regions) has been approved. The supervisory bureaus have already been established in 41 state controlled bureaus (mines). In some units, leading and professional cadres have been assigned to these supervisory bureaus.

(3) Mechanization has been developed in coal mines.

Mechanized coal extraction. In 1980, output from mechanized extraction in the state controlled mines totalled 106.3 million tons with an increase of 9.98 million tons above that of 1979. Coal extraction was 37.06 percent mechanized (in proportion to the total extraction output) and was 4.72 percent higher than in 1979.

Mechanized extraction comprises of three components:

First, ordinary mechanization, mainly with some 1,200 sets of ordinary coal extraction machines of Model 80 produced in China. An average of 453 sets were used in 1980 and 63.03 million tons, 21.97 percent of the total extracted amount, were produced this way.

Second, comprehensive mechanization. There are now 223 sets of comprehensive coal extraction equipment (52 sets produced in China and 171 sets imported). In 1980, an average of 93 sets were used and 37.73 million tons of coal, being 13.16 percent of the total extraction output or nearly the double of the 1979 output, were produced with these sets.

Third, hydropower extraction. In 1980, 5,534,000 tons of coal, or 1.93 percent of the total output, were extracted with hydropower.

In 1980, the indices of coal extraction with multi-purpose machines were all raised. Compared with 1979, the extraction output increased by 18.79 million tons; the average monthly output of each stope reached 33,600 tons, an increase of 5,920 tons over that of 1979; extraction efficiency was 11.2 ton/worker, an increase of 1.6 ton/worker. By the end of 1980, all the 100 sets of comprehensive mining equipment imported from foreign countries, had been delivered and 66 sets of them have been in operation. The average monthly stope output reached 42,800 tons, and the extraction efficiency was 12.3 ton/worker.

A number of fairly highly mechanized and advanced mines have emerged. Among them are Luan, Jixi, Shuangyashan, Yangquan and Jincheng mining administration bureaus, and another 55 mines, including Shigejie and Pangzhuang mines, with 70 percent mechanization. There are also 33 comprehensive extraction teams and 117 ordinary extraction teams, all up to the standards set by the Ministry of Coal Industry. Among them, the No 1 Comprehensive Extraction Team of Tongjialiang Mine in Datong had an annual output of 0.92 million tons with an extraction efficiency of 34 tons/worker.

Mechanized tunneling. In 1980, the state controlled mines were equipped with scraper and shovel loaders for rocks and coal, totaling 6,670 sets to be used in 2,850 tunnels. Tunnelling and loading (with stone-cutting machines, electrical drilling machines and rock-loading machines) were 37.49 percent mechanized, 1.9 percent higher than in 1979. Mechanization of loading in the rock-tunnel was 63.78 percent; in coal/rock tunnels, 42.32 percent; and in coal tunnels, 21.74 percent.

Investigations and study have been conducted on the way to complete an operation line in the mechanization of tunneling, and plans were laid down for equipment to be used in the rock tunnels. In some tunnels, drilling, loading and transportation are all beginning to be mechanized, and two mechanized operation lines--one equipped with excavating machines having retractable belts, and transportation machines having retractable belt, and transportation machines having hoisting belts; and the other equipped with heavy duty scraper conveyors--are beginning to take shape. In 1980, the tunneling footage carried out by these operation lines was 82,900 meters, being 1.21 percent of the total footage of all state-owned coal mines. Particular stress was laid on the 10 mechanized tunneling operation line of the Datong, Kailuan, Xuzhou and other mining administration bureaus. The coal tunnel mechanized operation line completed a footage of 6,926 meters in 1980, averaging a monthly footage of 577 meters. In April, the monthly footage was 1,125 meters.

The manufacturing and repairing of coal mining machinery. Most of the machinery used in the coal industry are made in China. There are now 173 enterprises producing this machinery and equipment, and 34 of them are key plants in the coal industry sector.

These 34 key plants now have more than 63,000 workers and 7,290 sets of metal cutters, 1,482 sets of forging and pressing equipment, and 750 million yuan's worth of fixed assets. Their main products are coal extractors, coal loaders, scraper conveyors, safety equipment for coal mines, and metal supporting and protective equipment.

When working under capacity in 1980, these 34 key plants took the opportunity to improve their product quality, increase the varieties and developed their technical services, besides producing 142,000 tons of products.

To change the situation of having "large and all-inclusive" and "small and all-inclusive" coal mining machinery plants, readjustment and restructuring are being carried out in accordance with the principle of economic rationality and specialization and coordination; and reorganization of these plants are now in progress. In 1980, the "China General Special Mining Equipment and Service Company" and the "China Coal Mining Safety Equipment Industry Company" are gradually developing their spheres of activities.

There are now 99 machinery repair plants for the state controlled and province-operated coal mines, with some 91,000 workers and staff members. These plants are responsible for the repair of coal mining equipment and the production of the accessories and spareparts.

(4) The number and scales of capital construction projects for the coal industry have been revised with particular stress on economic results.

Coal mine construction. The projects still under construction in 1980 were carefully reviewed and readjusted with particular stress on greater construction speed, higher engineering quality, lower production costs, and better investment returns. These measures have produced certain effects.

In 1980, an investment of 3.61 billion yuan in capital construction for the coal industry was spent. Out of this amount, 1,352 million yuan was spent on building new mines, and another 422 million yuan, on expanding the old mines and tapping their potential.

Thirty-one mines were completed and commissioned, with a total annual productive capacity of 8.29 million tons. Among them, 24 were new mines with an annual productive capacity of 5.93 million tons; and seven of them were expanded mines with an annual capacity of 2.36 million tons. Among these mines, 13 were of large and medium sizes with an annual productive capacity of 5.25 million tons.

There were four new mines with a designed capacity of 4.8 million tons annually.

The projects still under construction were carefully reviewed, and the construction of 22 of them with a designed capacity of more than 30,000 tons were put off for the time being. A number of auxiliary projects and preparatory projects for coal mines were also put off so that the funds could be more concentrated for more rational use.

To implement the policy of readjustment, the scale of construction in 1980 (for coal mines with a designed capacity of more than 30,000 tons annually) was reduced from 14,022 tons in 1979 to 11,433 tons. The new mining sites with an annual output of more than 10 million tons that are still under construction included the Gujiao mine of Shanxi, the Yangzhou mine of Shandong, the Huainan and Huaibei mines of Anhui and the Hanxing mine of Hebei; those with an annual output of more than 5 million tons included Tiefa and Shenbei of Liaoning, and Zaoteng and Yidatun of Shandong. Shanxi, where the verified reserves of coal amount to one-third of the total national reserves, has taken better advantage of its material resources, and stepped up the exploitation of coal mines. In 1980, the scale of the mines under construction in the province reached 18.14 million tons. Among them, Yanzishan of Datong and Xichu of Gujiao are large mines designed to produce 3 million tons annually. A great deal of preparatory work has been done for the large mines in Guishigao and Zhenchengdi of Gujiao. The three pairs of large shafts in Longzhuang, Baodian and Dongtan which are still under construction in Yangzhou Mining Area, Shandong, have been designed to produce 10 million tons. The Xinglongzhuang shafts with an annual output of 3 million tons will be in operation in 1981.

The construction enterprises undertaking capital construction for coal mining have achieved initial success in increasing their speed, raising their efficiency and work quality, reducing production costs and streamlining their construction management. The tunneling footage in the new mines exceeded the planned footage by 1 percent, and the quality of work in expansion, in building and in installation was raised by 38 percent, 67 percent and 76 percent respectively. The efficiency of tunneling for vertical shafts, horizontal and slanting rock tunnels is higher than in the previous year.

Geological prospecting. In our work of geological prospecting for coalfields in 1980, we were careful in attempting only the possible and readjusted the layout of prospecting by curtailing the scope of work on areas south of the Yanzi River where conditions of natural resources are rather poor; and concentrating our efforts on Shanxi, Henan, Heilongjiang, Anhui, Shandong and other key areas, thus accelerating the progress of prospecting.

Planning and designing. In planning and designing for coal mining in 1980, we have taken advantage of the opportunity afforded by the readjustment--when not many new projects were started--to carry out our work meticulously and well in advance as a preparation for the future construction of new mines. In 1980, a total of seven completed designs were completed for a productive capacity of 88.85 million tons; 20 preliminary designs for mines with a productive capacity of 16.44 million tons; and 11 designs for coal assorting plants, with a capacity for 18.4 million tons. We have also standardized and serialized our designs for universal application, and basically completed the designs for five types of large mines of 0.9 million-3 million tons; for coal-washing plants of 600,000 and 1.8 million tons; and for four or five types of machinery repair plants in the mining zones.

(5) Scientific research and education in coal industry are making headway.

Scientific research. The plans for scientific and technological development in the coal industry in 1980 called for 152 research projects including 39 key projects. More than 70 percent of these projects have been started according to, or basically according to, plan, and 51 of them have already produced results. The main achievements are:

The successful manufacturing of NDZ-18 single hydraulic jacks of the internal injection type and the DZ-18 light single hydraulic jacks of the external injection type to be used as means of support in completing the ordinary mechanization system of coal mining.

The successful manufacturing of BM-100 thin-seam extraction machines suitable for seams of 0.8-1.3 meters.

Successful manufacturing of XMY 540/1500-61 Model filter press and GUD-30 Model Wugezhedai [2477 2706 2124 1601] filter press, which can reduce the solid content in the filtered fluid to a level below the state-set standard. This is a new piece of equipment to reduce the loss of coal mud and to prevent environmental pollution.

Preliminary success in the research to recover pyrites in the washing of gangue.

The successful manufacturing of AZL-40 Model self-rescue apparatus, which can effectively prolong the time of protection from 40 minutes to 70 minutes.

Of the 50 items of advanced technical experiences popularized at the beginning of the year, 17 of them have already produced fairly satisfactory results.

Education and training. In 1980, the 11 coal institutes of higher learning under the Ministry of Coal Industry recruited 2,922 students and 36 research fellows. Eight mining academies were reactivated and they have established correspondence courses and enrolled 680 correspondence students. After readjustment and adequate staffing, 24 workers universities at the mining zones have been officially recognized as higher schools for workers, and more than 2,000 students are attending them. The leading bodies of the higher schools under the Ministry of Coal Industry have been reshuffled and strengthened, and among the 46 leading cadres newly appointed for these schools, nearly one-third of them are professors and assistant professors.

Coal mining technical schools are developing fast. In 1980, 11,200 students graduated in these schools, and 20,000 new students were accepted. There is now an enrollment of 45,000 students and some 8,000 teachers.

On-the-job training for workers is highly regarded. According to the statistics of 45 units, training was planned for 0.32 million out of 1.07 million workers in 1980; but the actual number of trainees turned out to be 0.35 million, with 82,000 of them undergoing fulltime training. The training program for comprehensive mechanized mining is even stricter. In 1980, fulltime training was given to 3,400 persons, while 250 bureau chiefs, mine directors and engineers in charge of comprehensive mining received rotational training.

Training for cadres was also stepped up. Plans for their training in 1981-1990 have already been worked out, and 25 cadre schools have been either reopened or newly established for a total of 5,600 persons.

Main Problems at Present and the Future Trend of Development

The situation of our coal industry is fine. However, there are also certain difficulties and problems confronting us. They are mainly as follows: the arduous tasks of readjustment in the present productive mines; the small scale of new mine construction which is inadequate for the national economic development; the simplicity of coal product mix, the low ratio of washed coal, and the unsatisfactory quality of coal which are disadvantageous for the rational utilization of resources; the technical equipment and management levels in our coal industry which are far behind those of the principal coal-producing countries; the low level of mechanization; and the unsatisfactory safety conditions which have not been basically improved and which have been the cause of many accidents.

The party and the state have always attached great importance to coal industry and decided to treat coal as the main source of energy enjoying priority in development. Proceeding from the actual conditions in our country, the party and state have formulated the important policy of "equal importance in exploiting the sources of energy and in conserving it with however priority to conservation in the immediate future." There are good prospects for the development of coal industry.

To meet the requirements of national economic readjustment and stability in people's livelihood during the readjustment period, the coal industry should not only carry out readjustments in the coal mines but also maintain its production at a certain level and, if at all possible, continue to develop. Therefore, attention should be paid to these "two speeds":

First, the speed of readjustment and consolidation, provided the present 600 million-ton production is maintained. State controlled coal mines should be properly guided, and the mines with favorable conditions should be helped in tapping potential and in technical renovation and transformation so as to increase their productive capacity. Protective policies and measures should be taken for the local coal mines so that they can maintain their present level of operation. Great attention should be paid to enterprise management and the consolidation of their basic work in order to produce better economic results. The coal mine machinery manufacturing and repairing trades should be readjusted and reorganized; scientific research and education should be developed to the maximum extent; and the workers' material and cultural life should be gradually improved.

Second, the speed of mine construction. During the period of readjustment, every effort should be made for an average productive capacity of 10 million tons to be derived from newly commissioned mines each year so that the investment will have quick return. Preparatory work should be carried out for expanded construction.

In the long run, the orientation of development for the coal industry should be as follows:

(1) The scope of construction for new mines should be larger, and exploitation should be faster. For development of the coal industry, the old bases should be fully utilized. If conditions are favorable, these mines should be expanded and transformed. New shafts should be built in old mining zones so as to increase their productive capacity. At the same time, we should systematically look for coalfields and new coal bases in areas where resources are favorable for development and communications and transportation are convenient. Shanxi, Eastern China, the Northeast (including the three leagues in eastern Nei Monggol) and Henan are the key areas for coal exploitation. Opencut coal mines should receive great attention. During the readjustment period, a number of small and medium-size coal mines calling for less investment and yet yielding quick results should be built. To speed up the exploitation, we should continue to expand and develop our cooperation with various friendly foreign countries and enterprises and make good use of foreign capital.

(2) The coal product mix should be changed in order to create the necessary conditions for energy conservation in society. The washing and sorting of coal should be quickly developed so as to improve the quality and increase the varieties to be supplied to the market. The coal-chemical industry should be developed along with research in the gasification and liquefaction of coal in order to develop its comprehensive utilization.

(3) Mechanization of coal mining should be developed and the safety conditions should be improved. Proceeding from our national conditions, we should develop mechanization for comprehensive extraction, hydropower extraction and ordinary extraction, and for the production of equipment for small-scale mechanization.

We should use the mechanization of coal extraction to promote all-round mechanization, strengthen mechanization in geological prospecting, well-drilling, structural building, washing and sorting coal, safety measures, and transportation so as to improve the technology and equipment for the coal industry in an all-round way.

(4) We should develop scientific research and education for the coal industry, pay great attention to training for cadres and workers, strengthen enterprise management, and gradually strive for scientific progress and modernization.

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ACHIEVEMENTS, FUTURE DEVELOPMENT OF POWER INDUSTRY

Beijing 1981 ZHONGGUO JINGJI NIANJIAN [1981 ALMANAC OF CHINA'S ECONOMY] in Chinese pp IV 65-67

[Article by Chen Zengqing [7115 1073 1987] of the Ministry of Electric Power Industry: "China's Power Industry"]

[Text] General Situation in Development

Before liberation, the power industry in China was very backward. In 1949, when the People's Republic was born, the total national generating capacity was only 4.3 billion kwh, ranking 25th in the world. The capacity of our power generating equipment was mostly concentrated in several large cities along the coast, with little left for the vast inland. For power transmission, there were several 154,000-volt and one 220,000-volt transmission line in the Northeast region. There was neither any high tension line nor high-voltage power grid in other areas.

After the liberation of the whole country, and after 30 years' construction under the leadership of the party and the government, the national generating capacity reached 282 billion kwh by the end of 1979, being 65.6 times that of 1949, and ranking seventh in the world. The average annual generating capacity increased at a progressive rate of 15 percent. By the end of 1979, the total installed capacity in the country was 34 times that of 1949, and had increased at an average annual progressive rate of 12.5 percent. The generating capacity and installed capacity of hydropower were 17.8 percent and 30.3 percent respectively of the total national generating and installed capacities.

In the past 30 years, many hydropower and thermopower stations and power grids were built throughout the country. After great changes in its geographical distribution, the power industry is no longer confined to the coastal areas as it was shortly after liberation. By the end of 1979, there were throughout the country 2,860 hydropower and thermopower stations (1,524 hydropower and 1,336 thermopower) each with an installed capacity of more than 500 kw; 70 of them were large ones of more than 250,000 kw with a total capacity of 30.52 million kw. A total of 32 power grids with more than 100,000 kw have been formed including 12 with more than 1 million kw. Throughout the country, there were also 801 kilometers of 330,000-volt; 25,000 kilometers of 220,000-volt; and 61,000 kilometers of 110,000-volt transmission lines. There were also 330,000-volt transformers of 1.9 million kilovolt-ampere, 220,000-volt of 63 million kilovolt-ampere, and 110,000-volt of 72.32 million kilovolt-ampere.

Along with the development of science and technology, new techniques have been extensively adopted in the power stations and power grids, and certain experiences have been accumulated in their construction and operation. The highest single generator capacity in hydropower stations has reached 300,000 kw with the highest head at 629 meters and the lowest at 6 meters. The equipment was all made in China. In the thermopower stations, the highest single generator capacity was 300,000 kw from China-made generators and 320,000 kw from imported generators. Many 200,000 kw units have been in operation. In the thermopower stations of 5 million or more kw, high-temperature and high-pressure units accounted for 62 percent; medium and low pressure steam condensation units accounted for 29 percent, and heat-supplying units accounted for 10 percent of the equipment, (the amount of heat supply each year being 722,000 kilocalories). Automatic safety devices have been installed for some large units in the power stations. For example, there are sequential devices for verifying the temperature and expansion of steam turbines, steam quality, equipment vibrations, shaft axial movement, and the oil system; and automatic controls for steam water, air and fuel systems of boilers. Some power stations have also begun to use electronic computers for the same purpose. In the power grids, technical measures have also been extensively adopted to increase stability in operation. In power transmission, for example, we have adopted the high speed single-phase double-closing gate with the addition of series compensating equipment. The power stations have adopted high-speed exciter automatic cut-off devices and automatic power brakes. They have also used carrier waves, microwaves, ultra-high generators, power transformers and power transmission circuits, a series of new devices are being used for relay protection. In the centers of large power grids, the use of remote communication, remote sensing, video display, and electronic computers are also used.

On the whole, the technical equipment for our power industry is backward, and the main consumption indices are all fairly high. In 1979, the consumption of coal for the supply of thermopowr by power stations of more than 6,000 kw was 457 gram/kwh (the standard coal consumption being only 422 gram/kwh). A total amount of 125 million tons of coal and 19.83 million tons of oil, equivalent to more than 110 million tons of standard fuel, were used for the supply of power and heat by the thermopower stations throughout the country. This amounts to 21.5 percent of the total fuel consumption in the country. Power consumption by power stations was 6.54 percent (0.195 percent being hydropower and 7.63 percent being thermopower) and transmission loss was 9.24 percent. The average utilization of power generating equipment was 5,175 hours in 1979 (3,112 hours in hydropower and 5,956 hours in thermopower). The average price of electricity in the country was 0.065 yuan, which has remained basically unchanged for 30 years.

The characteristics of the composition of our power consumption are high industrial consumption; rapid increase of consumption in rural areas; and very low consumption by communications and transportation and municipal administration. The situation of our power consumption in 1979 was as follows: Out of the total generated amount, 15.1 percent was used by the power stations themselves including the transmission loss; 65.4 percent, by industry (10.1 percent for light industry and 55.3 percent for heavy industry); 13.6 percent in the countryside; less than 0.5 percent in communications and transportation; and less than 5.4 percent in municipal administration. Since we have a population of nearly 1 billion, the power generation for each person is only 290 kwh (only 8 kwh in 1949). Power consumption is very low, and one half of all agricultural households, especially those in the mountainous and remote and frontier areas have no access to electricity at all.

Our power industry has developed fairly rapidly in the past 30 years. However, because of the mistakes in economic work, and particularly the disruptions during the 10 years of turmoil, the national economy has become unbalanced and power supply has long been inadequate. The whole country has been continually short of power for more than 10 years, and people's livelihood and the development of agriculture and industry have been seriously hampered. The power industry has become a striking weak link in our national economy.

Production and Construction in Power Industry in 1980

In 1980, production and construction in the power industry were guided by the policy of national economic readjustment. During the period of readjustment, the production and construction policy in the power industry was: first, efficient control and operation of the existing capacities of power generation and power supply, and some necessary improvement to be carried out for making full use of these capacities and reducing energy consumption; second, active measures for construction in order to exploit new power sources and to gradually change the situation of power shortage.

In 1980, the planned capacity of power generation was 290 billion kwh, but the actual generation was 300.6 billion kwh, a 6.6 percent increase over 1979. The hydropower generation was 58.2 billion kwh, a 16.1 percent increase over 1970. The thermopower stations throughout the country supplied 73.4 trillion kilocalories of heat, a 1.8 percent increase over 1979.

In 1980, 28 large and medium-size sets of generating equipment were commissioned as state capital construction projects. Among them, 13 sets were for hydropower and 15 were for thermopower. In addition, a large number of small power stations of less than 500 kw were newly built in the countryside. A total of 5.812 kilometers of 110,000-volt or more transmission lines and transform stations of 5.84 million kva were also completed.

In production, we continued to uphold the "Safety First" policy and, after consolidation, the basic work in the majority of power supply units has been strengthened, and there has been a marked improvement in safe production. On the basis of a drastic drop in 2 consecutive years, the number of accidents in production in 1980 was further reduced by 23.8 percent below that of 1979. The number of major accidents was reduced by 21 percent. Further improvements were carried out on the power stations and the power grids to make them more safe.

Because of strengthened technical control and economical operation, the main indices of consumption in 1980 have all been reduced. The ratio of power generation by high-temperature and high-pressure units has been raised. Coal consumption in the supply of electricity by power stations of 6,000 kw or more was reduced to 448 gram/kwh (the standard coal consumption being 413 gram/kwh), and a total of 2.9 million tons of coal were saved. The hydropower stations firmly adhering to the principle of rational use of water energy and water conservation, have lowered their water consumption; and the 26 backbone hydropower stations of the country have increased their generation by 1.6 billion kwh, which was equivalent to a saving of nearly 1 million tons of coal. For the conservation of power, we continued to encourage the economized use of energy in our daily life and adopted some technical measures for energy conservation. As a result, the rate of power consumption by all power stations of 6,000 kw or more throughout the country was reduced by 6.44 percent (0.19 percent for hydropower and 7.65 percent for thermopower), and a total of 260 million kwh of electricity was saved. Transmission loss was reduced by 8.93 percent with a saving of 770 million kwh. Furthermore about 7 billion kwh of electricity was saved by all trades and undertakings in society. New progress was also made in the reduction of oil consumption. All the power plants receiving fuel supply directly from the Ministry of Electric Power have increased their power generation in 1980 by more than 5 billion kwh over that of 1979, but their fuel consumption was reduced by 500 million tons.

Because of the newly increased generating capacity in 1980 by 18.6 billion kwh, and as a result of readjustments in the state industrial structure and the planned use and selective supply of electricity, power supply for agriculture, light and textile industries, and people's daily life in urban and rural areas are now basically assured, and the tight supply for some inland provinces and municipalities have become more relaxed. However, the supply is still very tight in the industrial bases along the coast, such as the Northeast, the Beijing-Tianjin-Tangshan, the Eastern China and other large power grids and some provincial grids. The average utilization of the power generating equipment throughout the country was 5,078 hours (3,293 hours in hydropower and 5,775 hours for thermopower). Although lower than in the previous year, this is still a very high utilization rate.

The composition of power consumption in 1980 was changed because of the national economic readjustment. Compared with 1979, rural consumption rapidly rose by 0.7 percent and industrial consumption dropped by 0.1 percent; but light industrial consumption rose by 0.5 percent, heavy industrial consumption dropped by 0.6 percent, consumption by communications and transportation remain stationary, and municipal administration rose by 0.1 percent.

Centralized and unified control was strengthened over the power grids in 1980. The power grids were expanded and power administration bureaus were established in the northwest and Northern China. The enterprises participating in the experiment of expanded decision-making power have generally achieved certain success.

In capital construction, following the reactivation of the Hydropower Construction General Bureau and the Power Construction General Bureau in 1970, a number of design units were restored in 1980. Advance work of capital construction was further strengthened and the work on the projects still under construction has been speeded up. In engineering management, consolidation of basic work and the practice of total quality control and the fixing of production quota have improved the engineering quality.

There were also new achievements in power science and technology. The management of enterprises generating and supplying power has been improved. A great deal of work was done by the financial departments at various levels in handing over profits to the state and in supplying enterprise funds; and by the supply departments at various levels in providing for the needs of production and construction. Definite achievements were also gained in economizing the use of materials and in inventory taking.

The ranks of workers and staff members have been further strengthened. Training was carried out for cadres and workers, and plans were laid down for the education of workers. Education organs were established and adequately staffed with professional cadres and teachers, and 21 workers universities were reorganized and strengthened. There are now higher correspondence schools, TV education, and vocational cultural and technical training classes in various forms as well as rotational training for leading cadres at various levels in separate groups. Advanced training classes of 2 years duration were also held for the young and middle-age leading cadres. In 1980, some 210,000, or 29.5 percent of the workers and staff members in units directly under the Ministry of Electric Power Industry attended these classes.

The livelihood of the workers and staff members in the power industry has also been improved to a certain extent. According to state regulations, the wages of 40 percent of the workers have been readjusted. In addition to regular rewards for production, the power production enterprises also offered rewards for fuel conservation and for the reduction of transmission losses in order to encourage energy conservation. The construction enterprises offered rewards for the conservation of steel materials, cement and timber, while the government establishments offered rewards in the form of profit sharing or rewards for keeping the budget balanced. Furthermore, a number of new dormitories have been built for the workers; and for the power industry sector, work has been started on a total floorspace of 3.8 million square meters.

Despite all these achievements in 1980, the problem of serious imbalance between the power industry and the other sectors of the national economy has not been basically solved, and other internal problems of the power industry, such as the imbalances among generation, transmission, transformation and distribution still exist in varying degrees among all power grids. In production and construction among all power grids. In production and construction, there are also many problems with safety in production, engineering quality, economic accounting and economic effects.

Orientation of Future Development for Power Industry

Power industry is an important component of energy industry. During the period of national economic readjustment as well as in long-range planning, the power industry should also treat exploitation as its main concern and endeavor to raise its supplying capacity. At present, the power industry is inadequate for the general demand, and the state is paying great attention to its development. In further readjusting the national economy and carrying out an overall reduction of capital construction projects, investment in capital construction for the power industry in 1981 will be reduced. However, this investment in proportion to the total investment in capital construction is still quite high and the number of projects as well as the scope of these projects have been increased, compared with 1980.

In the next several years, implementation of the policy of "readjustment, restructuring, reorganization and upgrading" will be continued in the power industry.

During readjustment, we should first bring into play the capacity of the existing power generating equipment and power grids, strengthen the management, and uphold the "Safety First" policy. We should develop power supply in a safe and economic way, and fulfill the various tasks as stipulated by the state for power generation in respect of both quality and quantity. Energy conservation is in line with our long-term policy in economic construction, and resolute measures should be taken in the power industry to implement this policy. We should continue to use power in a planned and frugal way, to supply power selectively, and to change oil-burning power stations into coal-burning ones.

Based on the characteristics of energy resources in our country, the energy policy for our power industry is to promote both hydropower and thermopower simultaneously and to adapt measures to local conditions for a fairly long time to come. Quantitatively, we have more water resources than coal and we must make every effort to raise the ratio of hydropower generation so that by the turn of the century, hydropower will amount to 25-30 percent of the total output. We have rich water resources, which can theoretically provide a reserve of 680 billion kw. Out of the 370 billion kw (capable of generating 1.9 trillion kwh) less than 5 percent has been exploited in large or small capacity units. In the long run, exploitation of hydropower should be concentrated in the Southwest, Central-south and Northwest areas, while in Eastern China, Northeast and Central-south areas, a number of medium-size hydropower stations should be selectively developed.

The establishment of coal and electric power bases should be expedited. Thermopower stations should be built mainly in Shanxi, Nei Monggol, Shaanxi, Ningxia, Henan and Anhui where there are rich coal resources. In areas where land and sea transportation is convenient and the power load is more concentrated, harbors and load center power stations should be built.

We should develop nuclear power in order to accumulate experiences. In places where energy resources are rather scarce, nuclear power facilities can be set up earlier. Other forms of power, such as geothermopower, wind power, tidal power, solar energy and marsh gas can also be carried out separately.

We should actively develop large-scale generating sets, and rely on the supply of generating equipment from domestic sources. Since we have a huge area and the use of electricity is widely spread out, generating units of 200,000 kw, 300,000 kw and 600,000 kw should be used in thermopower stations.

The centralized and unified management of power grids should be strengthened. According to the distribution of loads and energy resources, power grids should be developed by breaking down the barriers of administrative zones and in accordance with the principle of rational economics so as to fully demonstrate the strength of large power grid and to achieve the best possible economic results. Advanced technology and equipment should be adopted in the power grids so as to further improve the quality of the electrical energy and the dependability of the power grid operation. In future, electricity for the countryside should still come from the power grids, although at the same time, small hydropower stations, small thermopower stations, and small isolated power grids should also be developed.

Attention should be paid to scientific research, prospecting, design and other advance work as a preparation for future construction. At the same time, the work of environmental production should be strengthened in order to prevent the pollution of rivers and atmosphere by the generation of electricity.

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CHEMICAL INDUSTRY DEVELOPMENT TASKS OUTLINED

Beijing 1981 ZHONGGUO JINGJI NIANJIAN [1981 ALMANAC OF CHINA'S ECONOMY] in Chinese pp IV 67-71

[Article by Investigation and Study Office of the Ministry of Chemical Industry: "China's Chemical Industry"]

[Text] General Description

Our chemical industry has developed fairly rapidly. Before liberation, the foundation of this industry was very weak. There were only eight fairly large chemical industry plants and some handicraft workshops in Shanghai, Nanjing, Tianjin, Qingdao, Dalian and other coastal cities. In 1949, the output of sulphuric acid was 40,000 tons; that of soda ash, 88,000 tons; and that of chemical fertilizers, 6,000 tons. There were also processing of rubber products and production of pharmaceutical products on small scales, but basically no chemical industry.

After the founding of the People's Republic, under the leadership of the party and the government, the chemical industry has undergone great development mainly through self-reliance. From 1950 to 1979, production increased at an average progressive rate of 17.7 percent each year, being the highest in all industries in the country, as shown in the following table:

Year	Growth rate of all industries (%)	Growth rate of Chemical Industry (%)
1st 5-yr plan (1953-1957)	18.0	31.2
2nd 5-yr plan (1958-1962)	3.8	14.3
Readjustment Period (1963-1965)	17.9	23.9
3rd 5-yr plan (1966-1970)	11.7	17.3
4th 5-yr plan (1971-1975)	9.1	10.4
1953-1978	11.2	17.7

From 1952 to 1979, the total amounts of profits handed over and taxes paid to the state by the state-operated chemical industry enterprises (including enterprises of the pharmaceutical industry in and before 1978) was 2.5 times the investment in capital construction in the same period. The state's accumulation funds were increased.

Now, chemical industry has a fairly solid foundation. The chemical industry enterprises, owned by the whole people and having independent accounting, are in possession of 10.5 percent of the industrial fixed assets in the country; the total chemical industrial output value amounts to 12.8 percent of the total industrial output value in the country; and the profits and taxes from chemical industry amount to 12 percent of the total profits and taxes from the entire national industry. There are now chemical mineral products, chemical fertilizers, soda ash, inorganic salt, synthetic rubber, synthetic fibers, synthetic resin and plastic, organic raw materials, insecticides, dyes, paints, light sensitive materials, rubber products, solvents, auxiliary agents, catalyst, and others totaling more than 10 major trades, capable of producing a fairly complete assortment of products of more than 20,000 varieties. Most of the principal products are being produced on fairly large scales.

There are now 5,880 chemical industrial enterprises owned by the whole people and having independent accounting. The industrial layout has been improved. In addition to rebuilding some old enterprises and the building of a number of large new ones along the coast, many new enterprises have also been built in the inland. Chemical industry plants have been set up in Yunnan, Guizhou, Qinghai, Xinjiang, Ningxia, Nei Monggol and Xizang.

Chemical industrial output value in Shanghai, Beijing, Tianjin, Qingdao, Dalian and Shenyang accounts for more than 30 percent of the total chemical industrial products. These cities have become large bases where chemical industry is fairly highly concentrated. There has also been fairly rapid developments for the chemical industry in Guangzhou, Nanjing, Chongqing, Changzhou, Wuhan, Xian, Harbin and Taiyuan; and the output value from these cities account for approximately 10 percent of the total chemical industrial output value.

Following the completion of large integrated enterprises in Jilin in the 1950's, more than 10 other integrated chemical industry enterprises and large chemical fertilizer plants were built in Yanshan (Beijing), Qilu (Zubo of Shandong), Daqing, Guangzhou, Anqing, Yueyang, Jintang, and Luzhou. Their output value amounts to 17.5 percent of the total chemical industrial output value.

The total number of workers and staff members of the enterprises owned by the whole people and of the establishments of the chemical industry is some 0.28 million.

A number of fairly complete special units are being gradually set up for scientific research and engineering design. At present, there are in the whole country 180 scientific research units for chemical industry. Among them, 23 are research academies (institutes) directly under the Ministry. Eight academies (institutes) are under the large integrated enterprises, and 146 research institutes (sections) are run by the key enterprises. The chemical industry institutes of higher learning have also their own scientific research organs engaged in inorganic, organic, petrochemical industry, rubber processing, chemical mining, chemical industry machinery and equipment researches. There are also in the whole country 17 key engineering design units for chemical industry, and 13 of them are directly under the Ministry. Some large integrated enterprises have their own engineering design colleges, and many provinces and municipalities where chemical industry enterprises have been established in large numbers, have their own scientific research and design departments.

The development of our chemical industry has these characteristics:

First, small and medium-size enterprises as the main force. In the past 30 years, both the central and the local governments have attached great importance to the production and construction in chemical industry, and investment in this industry has constantly been increased. A fairly large portion of this investment comes from the local sources (including funds raised by the enterprises themselves).

Years	Ratio of Chemical Industry Investment to Total Industrial Investment by State (%)	Sources of Chemical Industry Investment	
		State Investment (%)	Local Investment (%)
1st 5-yr plan	4.8	91.4	8.6
2nd 5-yr plan	7.3	77.5	22.5
Recovery Prd.	11.4	89.9	10.1
3rd 5-yr plan	11.1	82.6	17.4
4th 5-yr plan	12.5	65.5	34.5
First 4 years of 5th 5-yr plan	12.4	69.4	30.6

Local investment and part of state investment are used for developing small medium-size enterprises so as to turn them into an important force. The ratios of outputs by large, medium and small enterprises to the total national output are shown in the following table:

Main Items (10,000 tons)	National Total	Large & Medium Enterprises Output (%)	Small Enterprises Output (%)
Pyrites	633.7	52.7	47.3
Phosphorus	851.8	52.2	47.8
Sulphuric acid	700	55.6	44.4
Soda ash	148.6	92.8	7.2
Caustic soda	182.6	80.4	19.6
Synthetic ammonia	1348.2	46.0	54.0
Fertilizers	1065.4	40.1	59.9
Insecticides	53.7	74.6	25.4
Plastic	79.3	72.6	27.4
Dyes	7.2	47.0	53.0
Lacquer	42.6	22.9	77.1
Calcium carbide	140.7	44.0	56.0
Synthetic rubber	12.1	100.0	-
Tires	1168.8	52.0	40.0

With the exception of a few major items, such as soda ash and synthetic rubber, the ratio of output by small enterprises is higher. More than one half of the national output of chemical fertilizers and synthetic ammonia is from small enterprises.

Second, a high ratio of chemical industrial products serving agriculture, light industry and textile industry. According to the composition of investment in capital construction, 57 percent of it is for agriculture; 20 percent for light and textile industries; and only 23 percent for other departments. In 1978, 72 percent of the total output value of chemical industrial products were intended for agriculture and the light and textile industries; in 1979, it was up to 77.5 percent. Chemical fertilizers in particular are the main product for the support of agriculture, and has all along occupied the leading position in the development of chemical industry.

Chemical Fertilizers (counted on the basis of 100 percent effectiveness)

Unit: 10,000 tons

1950 output	1965 output	1976 output	1977 Output	1977 Increase over previous year (%)
1.5	172.6	524.4	723.8	38.0

1978 Output	1978 Increase over Previous Year (%)	1979 Output	1979 Increase over Previous Year (%)	77-79 Average Increase (%)
869.3	20.1	1065.4	22.6	26.7

Apart from industrial and agricultural engineering plastics and the plastic sheets used in agriculture, development of the plastic industry has also supplied to the people a certain amount of plastic sandals, raincoats and other articles for daily life. In the dyeing material industry, there have been in the past several years more than 10 new varieties including the materials for dispersion, reduction and cation. These products have greatly added to the color and luster of textile products.

Third, the fairly rapid development of raw materials for chemical industry. The foundation of chemical raw material industry left over by Old China was negligible, and there was no organic raw material to speak of at all. This industry was basically developed after liberation. The ratios between the raw material industry and the processing industry at different periods are as follows:

Years	Raw Material Industry (%)	Processing Industry (%)
1st 5-yr plan	24.59	75.41
2nd 5-yr plan	19.98	80.02
Recovery Prd	42.81	57.19
1974	49	51
1975	52.2	47.8
1979	*48.7	51.2
	**56.4	45.6

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* Including pharmaceutical products, can be compared with previous years.

**Not including pharmaceutical products, cannot be compared with previous years.

The ratio of chemical raw material industry is gradually rising in the chemical industry. Development of the organic raw materials and the three major synthetic materials began in the 1960's. In the 1970's, following the establishment of large integrated enterprises in the chemical industry, this development was particularly rapid, as shown in the following table:

Unit: 10,000 tons

	1965	1975	1979	79 over 75 (%)	Average annual increase 75-79 (%)
Ethylene	0.30	6.5	43.5	669.2	60.8
Plastic	9.70	33	79.3	240.3	24.5
Synthetic rubber	1.59	5.67	12.06	212.7	20.8

The growth of other principal organic materials was also fairly rapid, as shown in the following table.

Unit: 10,000 tons

	1965	1975	1979	79 over 75 (%)	Average annual increase 75-79 (%)
Methyl alcohol	4.40	13.70	24.80	181.0	16.0
Acetic acid	2.08	6.69	11.55	172.7	14.6
Phenol	2.09	4.13	7.02	170.0	14.2
Pure Benzene	11.80	21.30	33.90	159.2	12.3
Acetone	0.73	2.20	3.25	147.7	10.2
Naphthalene (Industrial)	0.54	4.67	6.30	134.7	7.8
Butyl Alcohol	1.45	3.19	3.98	124.8	5.7

Fourth, continued success in scientific research and design breakthroughs. In the synthetic ammonia industry of the 1960's, we first adopted the technology of producing ammonium hydrogencarbonate with the process for carbonized synthetic ammonia and carried out three types of new catalyst process, such as zinc oxide desulfurization, low temperature transformation and methanization with synthetic ammonia production equipment capable of producing 50,000 tons annually, in order to promote the development of small and medium-size nitrogenous fertilizer factories. After the 30,000-ton synthetic ammonia equipment was in operation in the past several years, all the eight types of catalyst required were successfully manufactured one after another, thus assuring the independent production of synthetic ammonia in our own country. We are also able to manufacture the accessories and spareparts of the equipment and insure the normal operation of the equipment. Achievement in the other trades are: the combined method of producing soda ash; our own way of producing butadene rubber; the industrialization of alkaline salt production with the use of an electrolytic tank for anodic separation; the technology of selecting colloidal phosphorus which is now initially successful; the production of heavy water with our own equipment; the successful manufacturing of various chemical raw and semifinished materials for producing guided missiles and atomic bombs; and the gradual mastery of the methods of oil dissolving, dyeing and printing, and the production of color film. All these indicate the high standard of scientific research and production in chemical industry we have attained.

In the past 31 years, despite its great development, our chemical industry, on the whole, is fairly backward and inadequate for the national economic development, as shown in the following:

(1) Imbalance within the chemical industry. Raw materials and processing are not matching well. Since the beginning of the 1970's, although organic raw materials have developed fairly quickly, the general development is uneven because of a weak foundation. The prospecting and exploitation of chemical mines and the sorting of ores are still backward, and the development of basic chemical raw materials such as acid-based materials, is slow. The output of basic raw materials from the principal items down to various types of intermediates, auxiliary agents, solvents and catalyses are far from adequate for the processing capacity. Within the chemical fertilizer industry, there is an imbalance between nitrogen, phosphorus and potassium, with the ratios of phosphorus and potassium dropping every year.

(2) Irrational product mix. In chemical fertilizers, there are mainly nitrogenous fertilizers. The other chemical industrial products are mostly low-grade products, while the high-grade products serving light and textile industries and as accessories to durable consumer goods lack varieties. Their serial production is low, and the prices are high. Therefore, their production cannot make much progress.

(3) The large number of poorly organized small enterprises. Most of these enterprises are "small and all-inclusive" producing goods of poor quality with high consumption of raw materials, waste of energy and poor economic results. Although these small enterprises total up to 95.5 percent of all chemical industrial enterprises, the profits handed in by them amount to only 13.1 percent of the total profits, and their labor productivity is only about one half of that of the large enterprises.

(4) Insufficient attention to the transformation and improvement of existing enterprises. In investment, more funds are spent on building new enterprises than on the renovation of plants and equipment, on technical transformation, and on raising the quality of products. As a result, the old enterprises can only maintain their

simple reproduction and remain backward indefinitely. Among the old enterprises, the treatment of "three wastes," the solution of their storage problem and the improvement of workers' livelihood are long overdue. Because of insufficient raw materials, fuel and auxiliary engineering, some enterprises cannot make full use of their productive capacity, and their levels of production, technology and management are all quite low.

(5) Weak technological foundation for scientific research, design and education because of the 10 years of turmoil. There is poor coordination among the study of basic theories, and the development of technology and applied research. As a result, it usually takes a long time for the results of scientific research to be applied in production. The dislocation between technical development and the application of science hinders the popularization of new techniques and the improvement of old products. In education, there is insufficient attention to training in economic management, and the number of secondary vocational schools has been reduced. The ratio between university students and secondary vocational school students has been reduced from 1:3 to 1:1. The means of storage and transportation are also backward resulting in the slow turnover and export of products.

(6) Excessive import of complete sets of equipment, little import of technological patents, and insufficient attention to the digesting and absorption of advanced technology. In 1978, four complete sets of equipment were imported for ethylene and chemical fertilizers before careful feasibility study was conducted and before the sources of raw materials and funds were assured. This transaction turned out to be beyond our financial and material capability.

These problems show the arduous nature of the task of readjustment. However, it is only through readjustment and restructuring that we can adapt our chemical industry to our national economy and develop it in a healthy way.

Achievements in 1980

In accordance with the policy of "readjustment, restructuring, reorganization and upgrading adopted by the Party Central Committee, capital construction for chemical industry has been readjusted by putting off some large and medium-size projects. A number of small plants with high consumption and producing unwanted goods of inferior quality were closed, suspended, merged or retooled. For the plants widely spread out or producing duplicated goods, suitable centralization or division of work has been carried out. The products already in excessive supply are reduced or changed to other types, while the production of the items serving light and textile industries and being in short supply is increased. Applied science has been strengthened with a view to energy conservation, quality improvement and treatment of the "three wastes." While production of new goods is being actively encouraged, greater use is being made of the old products. The market is now playing its regulative role under the guidance of planning, and has helped promote the sales of some goods. Experiments have been carried out in various localities in the system of responsibility for profits and losses among different trades and in the expansion of decision-making power for the enterprises, and different forms of economic integration, such as general plants and specialized companies have been organized. In some localities, certain loosely integrated organizations cutting across different trades have been formed. In 1980, the chemical industry is steadily continuing its progress in the midst of readjustment and achievements have been won in production and construction.

The production quotas for 19 principal products in the whole trade were all overfulfilled. Production of those items serving light and textile industries and agriculture and those items to be directly sold in the market has been increased by a wide margin. Compared with the previous year, for example, the production of soda ash, caustic soda and sulphuric acid has been increased by 8.5 percent, 5.3 percent and 9.2 percent respectively, and that of chemical fertilizers was as high as 12.32 million tons, an increase of 15.7 percent. Lacquer, rubber shoes, plastic wares and other easily saleable goods have also been increased. There are now more than 700 varieties of rubber shoes produced by the chemical industry departments and sold on the market. Plastic floorings and furniture are now supplied on the market. The candies with floral designs produced by the Yanshan General Petrochemical Company have not only added to the gaiety on festive occasions at home, but are also sold on consignment in Hong Kong, Macao and Southeast Asia. For the textile industry, 49 varieties of medium- and high-grade dyes were added in 1980 alone to enrich the designs of textile materials. In Beijing, Tianjin, Shanghai and other large and medium-size cities, the production of chemical raw materials for the light and textile industries and to be directly supplied to the market is also rapidly increased.

The quality of products has shown further improvement. Following the winning of national prizes in the forms of gold medals, silver medals and citations by the Triangle Brand soda ash, the Sanshan Brand butadiene rubber, the Youyi Brand 729 "inwardly pimpled" [0646 5231 4721] table-tennis bats, and the Huili Brand rubber boots and 13 other products, the Shuangxian Brand vehicle tires, the Tianfu Brand industrial sulphuric acid, the Quan Brand white hydroxy acid enamel, the Panda Brand slip-in rubber shoes, and 35 other products have won national gold and silver medals and citations, while 222 varieties of products won fine-quality certificates from the Ministry of Chemical Industry.

Energy consumption has been greatly reduced. According to statistics by the key enterprises, energy consumption in the production of caustic soda, calcium carbide, synthetic ammonia and refined oil--normally requiring high energy consumption--has been reduced by 8 percent, and the energy saved in the whole year was equivalent to 3.3 million tons of standard fuel. In the small nitrogenous fertilizer industry, the success of energy conservation was particularly remarkable. Energy consumption for each ton of synthetic ammonia is as follows:

Year Item	1977	1978	1979	1980	Decrease in 1980 below 1979 (%)
Coal consumption (kilograms)	3766	3257	2740	2392	12.7
Electricity (kwh)	2005	1765	1590	1508	5.2

Economic results were improved. Compared with the previous year, the industrial output value increased by 6 percent; the production cost reduced by 0.8 percent; and the profits handed over to the state increased by 8 percent. The output value per worker increased by 4.6 percent. The losses on each ton of synthetic ammonia by the small enterprises were reduced from 65 yuan in 1979 to 10 yuan in 1980, and the total loss was reduced from 410 million yuan to 85 million yuan.

The export of chemical industrial products was all time high. In the early 1950's, there were less than 10 varieties of principal chemical industrial products for export and the export volume was only slightly more than 20,000 tons. In the late 1970's, the number of varieties was increased to more than 40, and the export volume was approximately 150,000 tons. Exports in 1980 brought in 1.1 billion yuan, an increase of 58 percent over 1979.

Year Items	1976	1977	1978	1979	1980
Profits handed-in (0.1 billion yuan)	17.02	18.85	39.00	43.50	47.00
Production Cost Reduction (%)*	-2.63	4.84	5.75	1.99	0.8
Output value per worker (yuan)	11344	13049	13072	15231	15930
Losses incurred** (0.1 billion yuan)		9.10	5.90	4.15	0.85
Reduction of loss below that of previous year (%)			35.16	29.66	79.5

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* by key enterprises.

** by small nitrogenous enterprises.

Trend of Future Development

In accordance with the requirements of the national economic readjustment, development in the chemical industry will be for some time to come orientated to the supply of accessories and raw and semifinished materials in serving light, textile, electronic, and building materials industries and the supply of chemical fertilizers, insecticides and other products in supporting agriculture with a view to meeting people's needs. At the same time, based on the requirements of the 800 million peasants and the urban population in their daily life, some chemical industrial final products should be sold on the open market. Therefore, we should gradually improve the product mix, reorganize the trades and transform the existing enterprises and help the industry continue its development.

(1) We should readjust the proportionate relationship within the chemical industry in accordance with the requirements of national economic development. The ratio between raw materials and the processing capacity should be further streamlined so as to give priority to the production of raw and semi-finished materials; to increase the output of basic materials, such as soda ash, organic chemical industrial raw materials and of such auxiliary products as various types of intermediates, additives, solvents and catalysts; and carefully handle the relationship between the productive and nonproductive sectors. Energetic efforts should be made to increase the production of phosphate fertilizers, and studies should be conducted in the exploitation of potassium resources. We should also develop the production of compound fertilizers and microorganic fertilizers and gradually correct the imbalance among nitrogen, phosphorus and potassium. We should develop our chemical industry in accordance with our national conditions, and increase the production of organic chemical products. In the course of readjustment, we should also strengthen our technological base to meet the requirements of production and construction.

(2) The product mix should be gradually changed. There should be more auxiliary materials, particularly plastic, fiber and various synthetic materials, for the light, textile, electronic and building industries. The production of easily marketable high-grade goods, such as high-grade dyes, synthetic lacquer, additives and refined chemical industrial products, should be increased so that in the not distant future, the durable consumer goods in popular use in our country can rely on the home market for the supply of a fairly large portion of raw and semifinished materials. There is still another question of readjustment of the product mix within the chemical industry. For insecticides, for example, we should add more new varieties and new forms, and produce more high efficiency and low-toxic insecticides and suitable amounts of germicide and herbicide, and teach people how to use them. Chemical industry enterprises should produce more final products to be sold on the market, or help the processing enterprises in processing handicraft arts by teaching them the necessary techniques.

(3) The different trades should be reorganized in a planned and systematic way in carrying out overall planning on a trade by trade basis. In accordance with the principle of sound economics and specialization and coordination, the enterprises producing similar products in far apart places should be organized on a regional basis into general plants or companies. The production of raw materials should be centralized, but processing should be properly distributed. If conditions are favorable, integration by cutting across different trades and different regions can be carried out. First, loose organizations can be formed mainly for the purpose of coordination, guidance, service and consultation. Large integrated enterprises should continue to carry out comprehensive undertakings. The blind development of small enterprises should be effectively checked.

(4) Full play should be given the existing enterprises so as to raise their production, technical and management levels. In transforming the old enterprises, stress should be laid on energy conservation, treatment of the "three wastes," and environmental protection. Through equipment renovation and technical transformation, these enterprises should continue to increase their outputs, improve the quality, develop new varieties and accumulate more funds. Hereafter, investment in chemical industry should be mainly used on the renovation, transformation and potential tapping for the old enterprises.

(5) Scientific research and education should be further developed. In the next several years, we should continue our efforts in strengthening scientific research with particular stress on the manufacturing of new products and the transformation of old enterprises. Scientific research and production should be organized in the form of contracts and other forms. In some cases, economic integrations can be formed. In education, besides continuing to promote higher education, we should selectively develop secondary technical schools and ordinary technical schools, and add a special course of economic management to the curriculum of some selected universities or vocational academies, in order to train more management personnel.

(6) Technical exchange with foreign countries should be promoted. In future, the practice of importing complete sets of equipment should be discontinued. If possible, we should import only new technology and single machines, and actively promote technical exchange and cooperation with foreign countries. At the same time, we should also keep abreast of world market conditions and gradually increase the export of chemical products.

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MACHINERY INDUSTRY SAID PRODUCING HIGH STANDARD EQUIPMENT

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[Article by Yan Qiushi [0917 3061 1395] of Policy Research Office of First Ministry of Machine Building: "China's Machinery Industry under the First Ministry of Machine Building"]

[Text] China's First Ministry of Machine Building is an important equipment department in the national economy. It has played an important role in socialist construction ever since the founding of the People's Republic.

The foundation of the machinery industry in Old China was very weak. There were only several small and medium-size machinery plants in Shanghai, Tianjin, Shenyang, Dalian and several coastal cities, all using backward technology and outdated equipment for repairing and assembling. The only thing they could produce were small electrical machines, belt-driven machine tools and some very simple machinery and power equipment. Such was the foundation of machinery industry left behind by the semifeudal and semicolonial Old China.

Implementing the policy of self-reliance and hard struggle, we have since the founding of the People's Republic gradually formed nearly 100 trades having machine tools, power-generating equipment, metallurgical equipment and mining equipment for the production of all-purpose machinery, motor vehicles and ball-bearings. Our machinery industry is now of a fairly high standard, and is capable of producing more than 26,000 varieties of machinery and electrical equipment. The total output value in 1980 was 51 times that in 1952.

In the past 30 years, the First Ministry of Machine Tools has supplied huge quantities of mechanical equipment, including many complete sets of a fairly high technological standard, for more than 3,000 large and medium-size projects in the country.

In the metallurgical industry, we have supplied a complete set of equipment for an iron and steel complex capable of producing 1.5 million tons of steel, and the equipment has been operating satisfactorily all along. We have also successfully manufactured 30,000-ton die-forging hydraulic presses, 2,800-millimeter aluminum plate rolling mills, 12,500-ton aluminum extruders, vehicle wheel rolling mills and other heavy machinery.

For the exploitation of energy resources, we have supplied complete sets of equipment for coal shafts with an annual capacity of 2.5 million tons, and for plants washing 3 million tons of coal annually. We have also provided the oilfields with equipment for drilling, extraction, collection and transportation, and equipment for refining some 2.5 million tons of crude oil. Other equipment supplied for exploiting energy resources includes 10,000 kw, 125,000 kw, and 200,000 kw thermopower generating units; and 225,000 kw large hydropower generating units of the mixed flow type. We have also trial manufactured 170,000 kw hydropower generating units having blades with variable pitch, and supplied 330,000-volt high tension transmission lines.

To meet the requirements of chemical industrial development, the machinery industry has supplied complete sets of equipment capable of producing 300,000 tons of synthetic ammonia and 240,000 tons of urea. This equipment is already in operation in the Wujing Chemical Industry Plant in Shanghai, and is producing up-to-standard products. At the same time, the machinery industry has also produced many varieties of highly technical equipment. There are now 110 varieties of high precision machine tools. For example, the Kunming Machine Tool Plant is now using a T42200 Model jig borer with illuminous data display, 0.01 millimeter precision, and a work bench 2 meters wide and 3 meters long. The Shanghai Machine Tool Plant is using S7450 Model lead screw grinders capable of making lead screws 5 meters long; and the SG7432 Model lead screw grinders suitable for "0" grade lead screws. The equipment used by the No 2 Motor Vehicle Plant for cold processing is mostly produced in China. It includes 10 automatic production lines and many specialized items of high efficiency.

Because of the development of machinery industry, our mechanical products are being sold in 97 countries and regions. We are now exporting lathes, forging and pressing equipment, freezing and cooling machines, motor-driven machines, ball-bearings, weighting instruments and cutting instruments, totaling 137 different products. We have also helped foreign countries build heavy machinery plants, power cable plants, ball-bearing plants, standard parts plants, and so forth by providing them more than 50 complete sets of equipment.

However, the structure of production in the first machine building industry is still not quite rational, and some equipment needed for technical transformation in various sectors of the national economy, and required in agriculture, light and textile industries and the service trade is in short supply or out of supply. Scientific research cannot keep pace with the growing need for technical improvement. At the same time, the system of management is not well organized, and should be improved for specialized production.

After readjustment of its service orientation and the expansion of the sphere of its service, the structure of machinery industry has been improved a little. While serving heavy industry, it is now busily taking care of the needs of the light and textile industries, and the needs in people's daily life, urban construction, technical transformation among old enterprises, and expansion of the export. In 1980, it produced for the light industry and the market 93 varieties of machinery and electrical products, and its output value was more than 3 times that of 1979.

It increased the production of plastic braiding machines, linen carding machines, shoe-making machines, slaughtering machines, and machinery for processing pharmaceutical products. It has also supplied many types of special equipment and automatic production lines of processing for technical transformation in the bicycle, motor car, sewing machine and clock and watch trades and thereby helped them raise their technical level in production. Because of the expanded sphere of their service, the output value of the first machinery industry in 1980 could still be maintained at the 1979 level despite the reduction of equipment required for capital construction during the national economic readjustment. The export of machinery and electrical products in 1980 increased by 60 percent over 1979. In 1980, the quantities of the main mechanical products produced by the machinery industry throughout the country were: lathes, 134,000 sets; forging and pressing equipment, 48,000 sets; power generating equipment, 4,193,000 kw; AC motor-driven machines, 25.7 million kw; motor vehicles, 222,000 units and ballbearings, 227.55 sets.

Restructuring of the economic management and the regulative role of the market under the guidance of planning have aroused the enthusiasm of the enterprises, and many of them are beginning to show some change, which is generally reflected in the following 10 aspects: (1) The change from mainly serving heavy industry to serving agriculture, light and textile industries, people's daily needs, urban construction and export; (2) the change from mainly serving capital construction to serving technical transformation among various sectors of the national economy; (3) the gradual change from one-sidedly striving for output value to organizing production according to demand; (4) the change from stressing output at the expense of quality to relying on fine quality as a means of survival; (5) the change from concentration on a single line of product to the production of many varieties and increasing the varieties as a means of development; (6) go from stressing supply of single items to the supply of complete sets with parts and accessories; (7) the change from stressing manufacturing and disregarding service to offering active services in the way of maintenance and repairs, installation, trial operation, and technical training; (8) the change from neglecting economic results to strengthening economic accounting and improving economic results; (9) the change from planning before signing contracts and dislocation between production and demand to planning production according to marketing, bringing production and demand into direct contact, and choosing the best planning according to the demand; and (10) the change from attention to only the domestic market to simultaneous attention to both the domestic and the world market and the expansion of the machinery export trade. All these changes indicate the gradual improvement in economic management and enterprise management in the first machine building industry.

Based on market demand, the method of integration to increase the production of goods in short supply and for specialization and coordination has produced good results. Many forms of integration have been adopted based on the actual conditions and in accordance with harmonized interests. There were integrations in production, in marketing, in exporting, in technology, in designing or in supplementing one another's functions. Many integrated bodies, organized to meet market demands for certain goods in short supply are fully tapping the potential of existing enterprises and organizing specialized production. By these means, they have improved the quality of products, increased the varieties, reduced the production costs, and speeded up the increase of production. Ningbo Municipality in Zhejiang used the Ningbo Water Meter Plant as the backbone to form an integrated organization of 19 plants to carry out specialized mass production, and the work was divided among them according to the spareparts used. In the past 3 years, both the output and the profits were approximately doubled each year. At the same time, the first machine tool industry gradually expanded the sphere of cooperation in forging, casting, heat treatment and electroplating to 33 cities where industry is highly concentrated, while striving for energy conservation, environmental improvement and increase of production along with the practice of economy.

The consolidation of enterprise management has helped raise the quality of products and improve the economic results. Instead of being concerned with only the rate of up-to-standard products, some enterprises are now keen on further upgrading them and producing brand name products. Some enterprises, hitherto paying only lip service to quality, are now keen in guaranteeing fine quality from the time of designing, manufacturing, inspection and marketing all the way down to their service to customers and market investigations. Some enterprises are paying attention not only to the geometrical precision of their products but also to their sustained precision and their dependability throughout their service life. Some enterprises too are using not only their factory standards but also the satisfaction of customers to evaluate the quality of their products. In 1980, 1,756 "trustworthy quality" groups emerged with 162 "trustworthy quality" products' and 29 of these products won national prizes for their fine quality. Among the prize winners were the T42100 Model double housing jig borer of the Kunming Machine Tool Plant; the Z3040 x 16 Model radial drill of the Shashi No 1 Machine Tool Plant and the Zhongjie People's Friendship Plant; the Shanquan Brand 3BA, 4BA, and 6BA Models single-stage centrifugal pumps produced by the Boshan Water Pump Plant; the 12,500-ton horizontal nonferrous metal extruder of the Shenyang Heavy Machinery Plant; the Yunfeng Model 100,000 kw hydropower generating unit of the Harbin Electrical Machinery Plant; the Leidian Brand 4114 Model spark plugs for motor vehicles of the Nanjing Battery Plant; the Diamond Brand 400 mm AC electric fan of the Guangzhou Yuandong Electric Fan Plant; the Shield Brand 1/2" and 5/8" roller chains of the Hangzhou Chain Plant; and so forth.

Improvement has been made in developing new products, new process, and new technology. In 1980, scientific research by the departments under the First Ministry of Machine Building successfully completed 600 projects and 939 new products have been manufactured. The successful projects which are of a fairly high standard are the manufacturing of a double-cone sealed structure for high-pressure containers with an outer diameter of 2-3 meters; the research with models on the low-pressure and medium-pressure ventilators; forging machine for the 350 millimeter steel stripes; the underground trackless internal combustion tunneling machines; the brushless rotary transformer; the silicon control arc hand welder, the Y series three-phase asynchronous motor; and other 1313 projects which are up to the advanced national standards. Another 50 technical achievements have helped fill some gaps in the country. A number of new products for energy conservation and environment protection have also been developed. At present, 18 varieties in 12 series have been developed to recover residue heat from boilers. Some machinery plants in Jiangsu have also developed air purifiers and devices for the treatment of contaminated water, sour gas and dust, which are all well received by the customers.

The main requirements in future are to take readjustment as the central task, reform the structure, reorganize the industry, transform the enterprises, and concentrate all resources to raise the level of production technology and to improve economic results in the first machine tool industry.

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SHIPBUILDING INDUSTRY ADVANCING; ENTERS INTERNATIONAL MARKET

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[Article by Hong Cang [3163 0221] of Investigations and Study Office of the Sixth Ministry of Machine Building: "China's Shipbuilding Industry"]

[Text] Shipbuilding has a long history in China, which was formerly one of the most highly developed countries in the world. However, under the long oppression of imperialism, feudalism and bureaucratic capitalism, development of modern shipbuilding industry has been very slow. Before liberation, people could only undertake repairs and fittings; even in shipbuilding, they could only perform a general assembly instead of manufacturing any of the required parts. There was no scientific research or designing personnel to speak of. Consequently China became more and more backward among the shipbuilding countries. On the eve of liberation, most of the shipyards were destroyed and production was at a standstill.

Since the birth of New China, shipbuilding has been greatly developed under the leadership of the party and the government. Now we have a comprehensive industry of a fairly high standard, and in addition to shipbuilding, we are capable of manufacturing fairly large diesel engines, auxiliary machinery and instruments and meters used on ships. This industry is now playing an important role in the national economy and in national defense.

Since the founding of the People's Republic, our shipbuilding industry has developed from repairing to building, from copying transferred patents to designing and building, and from the building of small vessels to the building of naval vessels, ocean-going vessels and various types of engineering ships.

Soon after liberation, the people's government confiscated the shipbuilding enterprises of bureaucratic and comprador capitalism, took over some shipyards controlled by foreign capitalists, and changed the private ownership of some plants into joint public and private ownership. Beginning from the First Five-Year Plan, the state expanded the large shipyards, hitherto mainly engaged in repairs and fittings, in Shanghai, Guangzhou, Dalian, Wuhan and Tianjin; and gradually turned them into shipbuilding bases. It also built or expanded scores of small and medium-size shipyards in the main navigation zones or fishery bases, and thus increased the capacity for building small and medium-size vessels for inland river and coastal navigation. At the same time, the technology in all shipyards gradually underwent an important change--from riveting to welding for the hull. By this time, the state began to plan for the establishment of shipbuilding research and design organs and later formed a design academy for ships. At first, materials and auxiliary equipment were imported, and we had to copy from others the methods of building certain naval vessels and 10,000-ton oceangoing vessels. In 1958, we built "Dongfeng," a 10,000-ton vessel, designed by ourselves and built exclusively with materials and equipment made in China. In 1960's, we built up and strengthened our technical forces for scientific research and designing by setting up a number of competent and fairly well equipped scientific research and design units so that we could carry out research and design for various types of ships. Furthermore, we selectively built plants for manufacturing diesel engines, navigation instruments and meters and other auxiliary equipment for shipbuilding. Thus an adequate system of auxiliary facilities was formed as a supplemental aid to general assembly. Since then, our shipbuilding industry has continued its development.

At present, China's shipbuilding industry is under the Sixth Ministry of Machine Building, the Ministry of Communications, the State Aquatic Products Bureau and the relevant departments in the provinces, municipalities and autonomous regions.

There are more than 100 enterprises and establishments under the Sixth Ministry of Machine Building, which also controls more than 70 berths, including 10 for ships of more than 10,000 tons; and nine docks, including three for ships of more than 10,000 tons. Among the shipyards, the well-known ones are the Jiangnan Shipyard, the Dalian Shipyard, the Fudong Shipyard, the Guangzhou Shipyard, the Zhonghua Shipyard and the Wuchang Shipyard. In the production of diesel engines and auxiliary engines, instruments and meters and other auxiliary equipment used in ships, the fairly well-known plants are the Henan Diesel Engine Plant, the Shaanxi Diesel Engine Plant, the Wuhan Ship Machinery Plant, the Wuhan Forging Plant, the Hanguang Machinery Plant, the Nanjing Maritime Auxiliary Machinery Plant, and so forth. The Sixth Ministry of Machine Building has also under it a number of research organs for ships and maritime equipment. Among them are the China Ship and Ocean Engineering Design and Research Academy, which is highly competent in designing; the China Ship Scientific Research Center, the largest research organ for ship performances; and other research institutes specialized in research work on maritime diesel engines, maritime mechanical and electrical equipment, and shipbuilding materials. There are also the Shanghai Shipbuilding Technical Research Institute, engaged in research for new shipbuilding techniques; the Jiujiang Precision Instrument Institute of Technology, engaged in the production of high precision and difficult technical equipment and elements; and the Shanghai Ship Engineering and Research Academy, which undertakes comprehensive designing. Furthermore, the Sixth Ministry of Machine Building has three affiliated institutes of higher learning, namely, the Shanghai Jiaotong University, the Harbin Ship Engineering College and the Zhenjiang Ship College; and two secondary vocational schools, in addition to the shipbuilding departments in some universities. With the cooperation of other departments, the Sixth Ministry of Machine Building has up to the end of 1980 built more than 14,000 ships of more than 500 types. They include 50,000-ton oil tankers, 25,000-ton cargo ships, 24,000-ton oil tankers, 15,000-ton oil tankers, 16,000-ton coal mining ships, 7,500-ton passenger-cargo ships and other large and medium-size transport ships, comprehensive oceangoing survey ships, ocean exploration ships, large dredging ships, high-power tugboats, self-elevating drilling platforms, and various special engineering ships, in addition to many types of naval vessels and subsidiary vessels for the PLA Navy. Besides ships, the Sixth Ministry of Machine Building has produced some other products not used by the ships. China's first 12,000-ton hydraulic press was manufactured by the Jiangnan Shipyard in 1958.

In 1980, all the enterprises under the Sixth Ministry of Machine Building fulfilled the state plans with fairly good results. The total output plan was overfulfilled by 20 percent; the commodity output value was overfulfilled by 18 percent; and the state profit quota was overfulfilled by 65 percent. More than 1,800 ships were built with a total 484,000 tonnage.

In May 1980, when China launched its carrier rocket into a Pacific Ocean area, the comprehensive survey ships, the ocean-exploration ships, the recovery ships, the oil-and-water supply ships, the oceangoing tugboats, and the engineering and escort ships--all made in China--formed an oceangoing convoy which successfully completed the tasks of recovery and escort. Practice has proved the fine performances of these ships which had attained the goal of "sailing out in safety, returning in triumph, and efficient in communications and data collection." This also showed the new development of science and technology in China's shipbuilding industry.

In 1980, the Sixth Ministry of Machine Building and its affiliated departments conscientiously implemented the policy of "readjustment, restructuring, reorganization and upgrading" mainly with the following performances:

Readjustment of the service orientation and change of the production structure. In accordance with the changing conditions in the domestic and world markets, the Sixth Ministry of Machine Building readjusted its service orientation and changed its structure of production in order to increase production and to expand the sphere of service. With the completion of its production tasks for the armed forces as a prerequisite, the Ministry expanded its productive capacity for ships and, besides supplying to domestic needs, watched the world market as an avenue for the export of ships and other mechanical and electrical equipment. While producing ships and other products required for ships, the Ministry also organized its production for light industrial goods, and goods not connected with ships. According to the statistics of plants producing auxiliary equipment, the output value in 1980 of goods for civilian use, and not for ships, amounted to 32 percent of the total output value of these plants. Furthermore, the development of petroleum industry at sea has brought about a further expansion of productive capacity for equipment to be used for offshore oil exploitation. The production of drilling platforms and oil-extraction platforms has marked a new trend in China's shipbuilding industry.

Restructuring the financial system and responsibility for profit quotas. This is a fairly important reform. Since 1980, the former system of planned profits has been changed, and the state has set up the system of profit quotas on a trade by trade basis. According to this system, the Sixth Ministry of Machine Building held most of its affiliated enterprises responsible for a certain amount of profits. For those enterprises which are not yet able to assume such a responsibility, some measures were adopted to encourage them to increase profits. Any enterprise overfulfilling the profit quota would have more economic benefits which served as an innate driving force for the enterprises to develop their production. In order to earn more profits, all these enterprises had to watch the market, to increase production and practice economy, and to improve the economic results. In 1980, even though the departments under the Ministry did not have enough tasks to perform according to state planning, their profits exceeded those of 1979 by a wide margin and was all time high. The system of responsibility for profit quotas played an important role among these enterprises.

Readjustment of investment orientation and clearing up the projects still under construction. The main purpose of investment is now to transform the old plants and to promote scientific research and education instead of building new plants. Accordingly, the ratios of investment in transforming old plants and promoting scientific research and education have been raised. Although state investment at the disposal of the Sixth Ministry of Machine Building were reduced, construction of the 10-ton berth of the Dalian Shipyard and the rebuilding of a 50,000-ton dock of the Jiangnan Shipyard still continued in order that the productive capacity could be expanded for 50,000-100,000-ton ships. In scientific research, advance research was strengthened. It was stipulated that the funds earmarked for advance research, applied research and basic theory research could not be less than 30 percent of the total research funds.

Beginning of management restructuring. In accordance with the spirit of a State Council directive, experiments have been carried out on the expansion of decision-making power in eight plants in Shanghai. This experiment has gradually eliminated the rigid control by too many administrative departments and further aroused the enthusiasm of the enterprises and workers. The Guangdong Shipbuilding Company and the Shanghai Power Equipment for Ships Company were established under the spirit of integration.

Further strengthening various basic work, improving enterprise management and raising the technical level. To increase the managing ability of leading cadres, enterprise management training classes were held for the rotational training of factory leading cadres. Short-course training classes, sparetime university for workers and TV universities were held to provide more education opportunities for all workers and staff members. Approximately 80,000 workers, or 30 percent of all workers attended these training classes. The promotion of total quality control was continued, and nearly 50,000 persons learned the basic knowledge of total quality control, which helped improve enterprise management and raise the quality of products. The rotary oars for small boats produced by the Dalian Shipyard, the comprehensive oceangoing survey ships produced by the Jiangnan Shipyard and 10 other products won state quality awards, including gold medals for three products and silver medals for the remaining nine. The cast steel anchor chain QC Group was commended as a national fine-quality group. With the method of total quality control, this group increased the elongation rate of the anchor chains from 14 percent to more than 22 percent, which was up to the international standard.

Orientated to the world market and initial success in the export of ships. This breakthrough gave an impetus to the readjustment and development of the shipbuilding industry and is of great significance in the history of China's shipbuilding industry.

In the past, China's shipbuilding industry produced ships mainly for China's own needs. Since the export of 3,700 tons of cargo ships in 1977, China's ships have entered the world market.

First, the state reformed the system of exporting ships. In 1978, the China Corporation of Shipbuilding Industry (CCSI) was formed. In March 1980, this company obtained state approval to operate as an independent export company as an example of "industry-foreign trade integration" with legal rights to export goods directly to foreign countries. The scope of its business activities includes the export of various types of ships and equipment for off-shore oil exploitation; the export and import of various types of main engine and equipment to be used on ships; organizing the import of new technology; licenced trade, joint designing, cooperative production, compensatory trade and processing customers' materials and joint venture; experimental research on fluid mechanics and structural mechanics for ships; ship designs and consultations; designs and consultations for shipyards, engine plants and instrument and meter plants; acting as agents or undertaking the joint operation of service stations for various types of engines and equipment manufactured by foreign factories for ships or other uses; and the supply of experienced technical personnel and workers for research work, designing and building ships. The relevant enterprises and establishments affiliated with the company can also conduct direct negotiations and sign contracts concerning exports and repair services. The China Corporation of Shipbuilding Industry has branch offices in Shanghai, Guangzhou, Wuhan, Jiujiang and Shenzhen to take care of export business.

To meet the requirements of international trade, the China Corporation of Shipbuilding Industry insures the quality of products and on schedule delivery according to the terms of contracts and is careful in the selection of auxiliary equipment that conforms to international standards. By these measures, it has improved various types of technical services. It also adopts flexible business methods in discussing with shipowners on the choice of equipment that can be used throughout the world and in selecting the correct classification society for the classification of ships. China has already signed agreements of technical cooperation with France, England, West Germany, Italy, Norway, Japan, Romania, Yugoslavia, Poland, Korea and the Soviet Union and to act on each other's behalf in getting ships classified.

To promote mutual understanding, the China Corporation of Shipbuilding Industry accepted an invitation from British Ocean Trade Company to participate in the "Exhibition of Ships Exported to the Far East in 1980" held in Hong Kong by that company. This was the first time for the China Corporation of Shipbuilding Industry to participate in an international civilian trade fair. China's exhibits attracted much attention from people of other countries.

"Integration of industry and foreign trade" is an important reform. The entry of our industrial departments into the world market, and the face-to-face contact between production and demand reduced the intermediate links so that both technical and economic responsibilities become more closely integrated. This aroused the enthusiasm of the industrial departments and enterprises. Since the China Corporation of Shipbuilding Industry held direct trade negotiations with foreign parties, its business has developed very rapidly. In May 1980, it signed a contract with

Liangcheng Navigation and Transportation Company in Hong Kong for the sale of its first 27,000-ton bulk cargo ship. By the end of 1980, further contracts were signed for 27,000- and 36,000-ton bulk cargo ships and a number of lighters totaling more than 30,000 tons. It continued to receive orders for drilling platforms, yachts and various types of small and medium-size ships, such as cargo ships, perishable cargo ships and timber ships, all below 5,000 tons. Besides exporting ships, the corporation also signed contracts with foreign merchants in the United States and other countries for processing containers, cranes, bulldozers, radios, taperecorders and so forth with materials supplied by the customers, and for compensatory trade. The Guangzhou Shipyard set up a branch factory for processing these containers. The building was completed in only 14 months, and the factory began its operation in September 1980. The products are entirely up to the standard as required by the BV Classification Society of France.

To meet the requirements of the world market and to speed up technical improvement, we imported from Denmark, West Germany and Japan the technology for producing low-speed and heavy-duty diesel engines for B&W ships, cranes, hold entrance covers, diesel oil generators for ships, hydraulic machinery used on the decks, and three other world famous brand name products in addition to the technology previously imported for other products. Some sample machines have already been trial manufactured. Furthermore, three items of technical transformation were carried out on shipyards and engine plants. Some plants have even established friendly relations or technical cooperation with foreign enterprises. They are using the advanced technical and management experiences of foreign countries for reference, and proceeding with the management restructuring and technical transformation within the enterprises.

Great achievements have been won in China's shipbuilding industry after 31 years' construction. However, there are still some problems which are mainly as follows: The system of management is not quite rational and the forces are somewhat dispersed, so that the potential cannot be fully tapped; industrial and enterprise management is still behind that of the advanced countries in the world; technical exchange with foreign countries is insufficient; and the ship's auxiliary equipment is still below international standards. These problems should be solved in the further readjustment of the national economy.

China has a huge area with a coastline of more than 18,000 kilometers, some 108,000 kilometers of navigation routes along the inland rivers and many deep and perpetually unfrozen harbors. All these are extremely favorable conditions for the development of shipbuilding industry. There is already a fairly solid foundation of this industry. Thanks to increasing international contacts, Chinese ships have entered the international market. Along with the further readjustment of the national economy, China's shipbuilding industry will certainly make due contributions to national defense, communications and transportation, expansion of export trade, exploitation of the sea, support for agriculture and improvement of peoples livelihood.

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ADVANCES, FUTURE PROSPECTS OF METALLURGICAL INDUSTRY REPORTED

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[Text] Historical Review

China is quite rich in coal, iron, nonferrous metals and hydropower resources. Up to now, more than 40 billion tons of iron reserves have been verified; and in addition to Anshan, Benxi, Jidong, Panzhihua, Xichang, Maanshan and Nanjing, there are iron mines in many provinces and autonomous regions. China's reserves in tungsten, antimony, tin and rare earth metals rank first in the world. Its deposits of zinc, lead, copper, aluminum, nickel, molybdenum, niobium, mercury, titanium and iron are among the foremost in the world, and some of them are in the second or third rank. This is one of the basic conditions for our development of metallurgical industry.

The technology of metallurgy in China has a long and proud history, dating back to the Stone Age. Huge amounts of unearthed bronze ware and the ruins of casting sites have testified that way back in the Shang Dynasty 2,100-3,700 years ago, the casting of bronze wares had already begun. The large square cauldron unearthed in the Yin Dynasty ruins in Anyang, called "Simuwu" weighs 875 kilograms. Many bronze wares have clear and artistic inscriptions on them, from which we can see the very high standard of metallurgical technology in the Shang Dynasty. In the old ruins of mining and smelting sites (from the ages of Spring and Autumn and the Warring States to the Song Dynasty) in the Tonglushan Mountain of Daye, a mine shaft more than 50 meters deep has been discovered, together with various types of furnaces, vertical as well as horizontal, for copper smelting and more than 400,000 tons of slag. It is estimated that nearly 100,000 tons of bronze had been smelted here--an indication of the broad scope and high technical level of copper mining and smelting in ancient China. Iron smelting dates back to the ages of Spring and Autumn and the Warring States some 2,500 years ago. The technology of pig iron casting and steel smelting developed rapidly in the Han Dynasty. The ruins of the iron-smelting site of the Han Dynasty located in Gurong Township of Zhengzhou occupies more than

60,000 square meters, where the remains of two iron smelting furnaces, with a total cross-section area of 8.5 square meters, and weighing more than 20 tons can be seen. In the Han Dynasty, the technology of "tempering steel 100 times" was also invented. In 1974, a long sword of 111.5 millimeters which had been "tempered 30 times" was unearthed in Cangshan of Linyi Prefecture, Shandong Province. Tests revealed that the inner structure of the steel was fairly well balanced and that it had a correct amount of carbon contents. After quenching, the sharp edge of the blade contained very little impurity. According to some engraved records, this sword was made in 112 AD indicating tht as early as the age of Eastern Han, China had already mastered the forging techniques for producing high-quality steel. According to history, gold and silver were used by our ancestors several thousand years ago. There were golden ware before the Shang Dynasty, and gold pieces were used as currency in the principality of Chu. In the "nade clothes sewn with gold threads" found in the grave of Liu Sheng, Prince of Zhongshanqing of Western Han, and his wife, pieces of jade were sewn together with gold threads formed of 0.14 millimeter strands. A total of 1,800 grams of gold were used on these two jade-dresses. Such a large quantity of gold and jade and the very fine workmanship were something very rare at that time. Liu Yuxi, a poet in Tang Dynasty, wrote these lines after his banishment to Naozhu:

> "The sun has lifted the fog from Zhengzhoujiang;
> Crowds of maids are seen panning in the river banks.
> The jewelry of famous beauties and the seal of princes,
> All came from the sands under the roaring waves."

This poem is a vivid portrayal of gold panning, then a popular occupation for the laboring masses in ancient days.

After the Opium War, the modern industry of metallurgy became very backward in semicolonial and semifeudal Old China. In 1980, Zhang Zhidong, Governor of Hunan, Hubei, Guangdong and Guangzi, and some other officials were the first to build the Hanyang Iron Foundry (later renamed as Hanyeping Company) as a preparation for railway building. This foundry can be called the first modern iron and steel plant in our country. However, because of the [illegible] mistakes by the decision-maker in the analysis of mineral ores, and the selection of the plant sites and types of equipment to be used, the construction dragged on, the technology was substandard, and the economic results were poor. Despite every effort made, the iron and steel produced could not be made into the required steel rails. From that time to 1948, or in approximately half a century, the total steel output in Old China was less than 7 million tons, the highest annual output being 923,000 tons (1943). The outputs of copper, tungsten, antimony, tin and mercury were not much either, and there was practically no smelting or processing industries. In 1949, when New China was born, the steel output was only 158,000 tons, the 26th from the top in the world; and total output of nonferrous metals, such as copper, lead, zinc, tin and antimony, was also very low. We had basically no aluminum industry, nickel industry or any other impotant nonferrous metal industry.

It was in such a miserable state that New China was born. Since then, under the leadership of the CCP, our metallurgical industry began almost from scratch, and then continued to substitute modern methods for indigenous methods and spread out from a few localities to all over the country. Thanks to the hard struggles of all people in the past 30 years, we have developed it into a fairly complete and efficient system consisting of large, small and medium-size enterprises and achieved what Old China could not even dream of. This shows the strong points of the socialist system as follows:

First, the rapid increase of production. From 1949-1979, the total state outputs of iron was 430 million tons; steel, 397 million tons; and rolled steel, 278 million tons. In 1979, steel output reached 34.48 million tons, ranking fifth in the world; and compared with the 1.35 million tons in 1952, the average progressive increase rate was 12.8 percent each year. For 10 different nonferrous metals, the average progressive increase rate was 10.6 percent each year.

Second, improvement in the industrial layout. While developing the metallurgical industry in the coastal areas, we have also carried out similar developments in the inland; and while developing large key enterprises, we also developed the small and medium-size ones. Let us take the annual productive capacity of the large iron and steel enterprises for steel as an example. In the coastal areas, that of Anshan Iron and Steel Company was nearly 7 million tons; that of Shanghai Iron and Steel Company, 5 million tons; and those of Shoudu, Tangshan, Tianjin and Benxi iron and steel companies, all above 1 million tons. In the inland, that of Wuhan, Baotao, Taiyuan and Panzhihua iron and steel companies are between 1 million and 3 million tons. While building and expanding more than 10 large iron and steel enterprises, we have also set up more than 10 special steel plants, scores of medium-size iron and steel plants, and nearly 100 small iron and steel plants, all spread out in various parts of the country. The situation of nonferrous metal industry is generally the same. In the aluminum industrial sector, for example, we have built not only large oxidized aluminum plants and electrolytic aluminum plants, but also aluminum processing plants. These large aluminum plants were spread out over Liaoning, Heilongjiang, Shandong, Nei Monggol, Henan, Guizhou, Sichuan, Gansu and Ningxia. Many provinces, municipalities and autonomous regions have also built their own small aluminum plants.

Third, development in the varieties and quality of products. Old China could produce 100 common types of carbonized steel; now we can smelt more than 1,000 types including high-temperature alloy steel for aviation, pure iron for high-energy accelerators, and high precision alloys. In accordance with the characteristics of our national resources, we have also set up systems for the production of alloy steel containing silicon, manganese, nickel, tungsten, molybdenum, vanadium, titanium niobium, boron and rare metals. In 1953, we could produce rolled steel of only some 400 specifications; now the number of specifications is more than 20,000. We have not only for the first time solved the problems of metal materials required for building railroads, trains, motor vehicles, airplanes, ships, agricultural machines, heavy machinery, power stations, large plants and products for the light industry and the market, but also made breakthroughs in manufacturing sophisticated materials so that many materials required for making atomic bombs, hydrogen bombs, guided missiles, artificial satellites, and nuclear submarines are basically available at home.

Fourth, great improvement in metallurgical technology and equipment. From 1950 to 1979, the state invested a total of 73.1 billion yuan in metallurgical capital construction (including 35.7 billion yuan in the iron and steel industry). By the end of 1979, the metallurgical industry owned 55.11 billion yuan of fixed assets in original value and 39.45 billion yuan in net value in addition to 6.52 million tons of equipment. Some equipment items are of the 1950's and 1960's vintage, and many are outdated and backward, and need to be gradually replaced; on the whole, however, the technical equipment for our metallurgy has been greatly improved after technical transformation and importation of technology. For mining, we have large gear-driven drills, power shovels and electrically operated trucks. For iron smelting, we have large blast furnaces of 2,580 cubic meters, and the Shoudu Iron and Steel Company has remodelled its No 2 blast furnace into a coneless top-burning hot air furnace. In steel smelting, top blow oxygen converters have been built up to a nominal weight of 150 tons; open hearths, up to a nominal weight of 500 tons; and electric furnaces, up to a nominal weight of 500 tons; in addition to oxygen making machines capable of producing 35,000 cubic meters per hour. In steel rolling, the Wuhan Iron and Steel Company has imported a highly automatic 1.7-meter rolling mill for continuous cold and hot rolling; and the Benxi Iron and Steel Company has also installed an 1.7-meter continuous rolling mill designed and made in our own country.

Fifth, the building of a mighty contingent of workers and staff members. By the end of 1979, there were in the whole country 3,107 metallurgical enterprises and establishments, including 2,313 production enterprises, 219 capital construction units, 66 scientific research institutes and 61 metallurgical colleges. The total number of workers and staff members in the whole metallurgical sector was increased from 0.38 million by the end of 1952 to 3.81 million by the end of 1979. Among them, 2.96 million were engaged in production; 0.48 million, engaged in construction and assembling; 112,000 engaged in geological prospecting; 35,000 in prospecting and designing; 39,000 engaged in scientific research; and 36,000 attending universities, vocational colleges and secondary technical colleges. Among the 3.81 million personnel, 0.6 million were cadres, including 190,000 engineering technicians (of whom approximately 110,000 were university graduates.)

In the past 30 years, the metallurgical industry has won achievements and met with setbacks. Because of the counterrevolutionary sabotage by Lin Biao and the "gang of four," as well as certain mistakes in our work, this industry has suffered great loss after several setbacks. Were it not for these setbacks, there is no doubt that the achievements could have been greater and better.

Advance in the Process of Readjustment and Restructuring

The correct line formulated by the Third Plenary Session of the 11th Party Central Committee, followed by the Party Central Committee's policy of national economic readjustment, restructuring, reorganization and upgrading have pointed out the direction for the advance of metallurgical industry. For a fairly long time, the metallurgical industry, particularly the steel industry, had been influenced by the guiding thought of rash and reckless advance, and were apt to stress capital construction with little regard for production; to strive for greater and faster, but not better and more economical results; and to pay more attention to smelting and mineral extraction than to tunneling and stripping. Furthermore, economical results, the workers' livelihood, safety measures in production and environmental production did not receive due attention. Particularly in 1977-1978, the Baoshan Iron and Steel Works was hastily started according to a grandiose scheme calling for high targets which were inconsistent with conditions in our country. A complete set of equipment was imported in violation of the principle of attempting only the possible and further aggravating the disproportion. This disproportion must be readjusted, and the system of economic management characterized by "eating out of the same pot" should also be gradually changed. The destruction suffered during the 10 years of turmoil and the very backward enterprise management should also be vigorously remedied and improved. In other words, there is now an arduous task of readjustment and restructuring for the metallurgical industry. Under the correct leadership of the Party Central Committee and the State Council, and thanks to the combined efforts of all the workers and staff members and the support from various quarters, new achievements were won on the metallurgical industrial front, and some significant change took place in 1980. For the metallurgical industry, this was the year of advance in the process of readjustment and restructuring.

First, 1980 witnessed the highest production and economic indices in the history of metallurgical industry in our count[illegible]e main indices were as follows:

Items	Actual level in 1980	Increase over previous year (%)	Compared with all previous records
Rolled steel (10,000 tons)	2,716	+8.8	highest
Steel output (10,000 tons)	3,712	+7.7	highest
Including:			
Oxygen top-blown converter produced steel	1,509 (40.7% of total output)		
Open hearth furnace steel	1,189 (32.0% of total output)		
Electrical furnace	711 (19.1% of total output)		
Others	303 (8.2% of total output)		
Pig iron output (10,000 tons)	3,802	+3.5	highest
Total output value for whole industry (0.1 billion yuan)	430.27	+4.9	highest

Second, 1980 was also a year of change in the product mix of the metallurgical industry marked by a rise in the ratio of consumer goods. In the past, the makeup of the national economy was biased toward heavy industry and many enterprises were not aware of the need to serve agriculture, light industry, civilian housing and the market with their products and paid little attention to the production of "attractive, low-price and readily marketable" goods to meet the diversified requirements of the national economy. Therefore, some products urgently needed by the state and the people in their daily life were not enough for the demand in either quantity or quality. On the one hand, for example, the strip steel used for making bicycles, the tinplates for making cans, and the wire for building houses became short-line products and most of them had to be imported. On the other hand, heavy rails, wheels, tires, large-size steel products, steel plates of medium thickness and so forth have become long-line goods because of temporary poor sales. In readjusting its product mix in 1980, the metallurgical industry produced more short-line products and less long-line products, improved the quality and established the concept of serving customers. Some gratifying changes soon occurred. Let us take rolled steel as an example. In 1980, 27.16 million tons were produced, an increase of 2.19 million tons over 1979; the output of the four major short-line products, namely, wire, small-size steel products, thin plates and welded pipes, was increased from 12.08 million tons in 1979 to 15.51 million tons, an increase of 3.43 million tons or a 28.4 percent increase over the previous year. In 1978, the output of these four products in short supply was only 44 percent of the total rolled steel output; in 1980, it was raised to 57 percent. At the same time, output of the three steel products that were in full supply, namely, heavy rails, large-size steel products and plates of medium thickness, dropped to 4.23 million tons in 1980, a decrease of 0.56 million tons or an 11.7 percent decrease. In 1980, there were several special characteristics in the readjustment of the orientation of production in the metallurgical industry.

First, orientation to demand, particularly the demand by light industry and the market. For the production of high- and medium-grade bicycles, for example, Nos 1, 3 and 10 plants of the Shanghai Iron and Steel Company increased their production of manganese strip steel by thousands of tons; No 5 Plant of the Shanghai Iron and Steel Company made great efforts to increase the production of hair springs for clocks and watches in order to meet the requirement of this industry throughout the country; the Shanghai Iron and Steel Institute successfully manufactured a gas elimination agent, mass produced it and help prolong the service life of China-made TV sets from 2,000 to 8,000 hours. For the Wuhan Iron and Steel Company, 1980 was the first year of operation for its 1.7-meter rolling mill. In that year, the hot rolling mill produced 0.88 million tons of strip steel; the cold rolling mill produced 0.26 million tons of steel plates; and the silicon steel plant produced 48,000 tons of sheet metal, including 70,000 tons of galvanized sheets urgently needed in light industry and the market, 20,000 tons of tinplates, 10,000 tons of enamelled sheets, 44,000 tons of strip steel for bicycles, 13,000 tons of silicon steel plates, 45,000 tons shipbuilding plates, and 150,000 tons of motor vehicle plates. These products were sold to more than 1,000 users in the country and nearly 50,000 tons of them were exported. Although the productive capacity of this set of new rolling mill of the Wuhan Iron and Steel Company has not yet been fully utilized; the quality of its products is not yet up to the consumers' requirements; and the level of company management is low, there is no doubt that this rolling mill has great potential and can play an important role in helping our steel industry to turn to the production of consumer goods and in serving technical transformation in our national economy. Formerly, the stainless steel plates used by the enterprises under the Ministry of Textile Industry for making guide rollers and welded tanks had to be imported from abroad. After making three rounds of visits to the customers, the Fushun Iron and Steel Plant carried out trial production and trial applications which all turned out to be successful. Now the consumers of these products are ordering their goods at home. The production of processing nonferrous metal materials was mainly for the heavy industry and the national defense industry. In 1980, it began to serve light and textile industries. For example, the production of such goods in short supply as aluminum foils, extra-thin aluminum sheets, and copper casings for antennas, was increased by 42 percent over 1979. The Northeast Light Alloy Metal Processing Plant, and some others have successfully trial produced many new products for civilian use, such as aluminum bicycles, aluminum window frames and aluminum hoses for irrigation in agriculture.

Second, improvement of quality according to the customers' requirements. In 1980, 17 varieties of metallurgical products won national prizes for fine quality, and 158 products were rated as fine-quality goods of the Ministry of Metallurgical Industry. Among the winners of national gold medals were the Swallow Brand aluminum plates with hardened surface produced by the Southwest Aluminum Processing Plant; and the shipbuilding plates and templets produced by No 1 Plant of the Shanghai Iron and Steel Company, the Wuhan Iron and Steel Company and the Anshan Iron and Steel Company. These products are well received by the consumers in the world market. The Anshan Iron and Seel Company noted six common defects in their products, namely, the impurity in the steel, the poor performances of products, the incorrect measurements, the lack of luster on the surface, the indistinct symbols, and the unsatisfactory packings; and accordingly organized 90 work groups to carry out the required improvements. Through such measures as outside furnace refining and inside production line testing, the quality of their steel products were greatly improved and later rated by the higher authorities as products of excellent quality. The varieties of their products were increased from 16 in 1979 to 55 in 1980. Among them, the vehicle shock absorbers with a 08 dampening factor was rated as fine-quality product and awarded a gold medal. The Northeast Light Alloy Metal Processing Plant studied the 227 problems pointed out by its customers and mobilized the whole personnel into a shock force to tackle them. With 1 year, 210 of these problems were solved. All the three major problems which had remained unsolved for more than 10 years, such as the oxidized coatings in forging, the performance of templets made of thin magnesian alloy plate, and the corrosion of the templet surfaces, were all solved. The extra-fine aluminum powder also won a silver medal. Of course, there are still many other problems with the quality of metallurgical products as a whole, and we are far below the advanced international standards. Further improvement is therefore necessary.

Third, frequent visits to customers, market inspections, economic forecasts and attentive services to customers. In 1980, the Ministry of Metallurgical Industry organized inspections and forecasts on the demand for steel materials, and the vice ministers and department chiefs led different groups to visit the customers in the light and textile industrial trades. All the key enterprises and the metallurgical bureaus in various provinces, municipalities and autonomous regions have formed sales organs or market inspection organs and done a great deal of work in visiting, inspecting, forecasting and offering services. In 1980, for example, the Shanghai Smelting Plant specially set up a sales section, staffed with engineers and technicians, for market inspection and service to customers. In 1 year, more than 20 newsletters with information on the sales were issued, and a large number of problems pointed out by the customers were solved. When they learned that aluminum-nickel compound powder could not be produced in China and had to be imported, they made every effort in its trial production and finally succeeded. The quality was up to the international standard and the product was supplied to 52 users in the country. The Fushun Iron and Steel Plant also specially set up a technical service section under the direct leadership of the plant director and staffed with engineers and many specialists. This section's service included serving as advisers to the customers, helping them in technical renovation, handling and solving problems of quality of products, complying with special demands by customers, and undertaking precision processing on behalf of customers. In this way, production and demand became closely related in technical matters resulting in higher prestige and a larger market for this plant.

Third, 1980 as a year of reduced energy consumption and progress for the metallurgical enterprises in the process of energy conservation. The metallurgical industry, particularly the iron and steel industry, is a large energy consumer. In 1979, the energy consumed by the metallurgical industry was equivalent to 83.26 million tons of standard coal, being 14.2 percent of the entire national consumption; and the energy consumed by the iron and steel industry was equivalent to 72.69 million tons of standard coal, or 12.4 percent of the entire national consumption. The overall consumption of energy for the production of each ton of steel was as high as 2.28 tons, almost doubling the amount of the advanced foreign countries. Even in the key enterprises, the average overall consumption of energy on each ton of steel was also as high as 1.57 tons, and the comparable energy consumption on each ton of steel was as high as 1.285 tons. Such high energy consumption was something the state could not afford and not conducive to the development of either light industry and national economy or of the metallurgical industry itself. Therefore, the metallurgical industry can only further develop itself on the basis of reducing energy consumption. In 1980, all metallurgical enterprises made great efforts to strengthen energy control and carried out preliminary technical transformation with energy conservation as the central task. At the same time, the policy of supplying energy only to the deserving ones was implemented with success. Although steel output increased by 2.64 million tons in 1980 over that of 1979, energy consumption (70.9 million tons) was reduced by 1.79 million tons of standard coal. Thus the goal of saving energy along with increasing production was attained. The average overall energy consumption for each ton of steel was reduced to 1.47 tons; the comparable energy consumption on each ton of steel dropped to 1.2 tons; and the coke burned for each ton of iron was reduced from 553 kilograms in 1979 to 539 kilograms. The performance of the Anshan Iron and Steel Company was the best among the large iron and steel integrated enterprises. Its overall energy consumption for a ton of steel dropped to 1.225 tons of standard coal and the comparable energy consumption dropped to 1.014 tons of standard coal. Among the medium-s[illegible]tegrated iron and steel enterprises, the Hangzhou Iron and Steel Company was [illegible]st. Its comprehensive energy consumption for each ton of steel dropped down [illegible].33 tons of standard coal and its comparable energy consumption dropped down to 1,101 tons of standard coal. Both companies attained the goal of saving energy along with increasing production. In the nonferrous metal industry, a total of 0.4 million tons of standard coal was saved in 1980 compared with 1979. The consumption of DC electricity on each ton of aluminum by the key aluminum plants was reduced from 15,820 kwh in 1979 to 15,432 kwh in 1980, the best record ever attained. The aluminum plants in Fushun, Zhengzhou, and Baotou also reduced their consumption of DC electricity to below 15,000 kwh.

Fourth, 1980 as the year of strengthening economic concept and stressing economic results for the metallurgical industry. For a long time, there has been great waste in the metallurgical industry and their economic results were far from ideal. From 1950 to 1979, the state invested a total amount of 73.1 billion yuan in the capital construction for this industry, and the profits handed over and the taxes paid to the state during the same period amounted to 90.7 billion yuan. Thus for every yuan invested, the profits and taxes amounted to only 1.24 yuan (the amount was even less in the iron and steel industry, being only 1.1 yuan). Compared with the average amount of profits and taxes, namely 2.8 yuan, from industry in the whole country in the same period, the amount from the metallurgical industry was less than one half. If we calculate the capital profit rate by this formula,

$$\frac{\text{Profit}}{\text{net value of fixed assets - circulating funds used}} \times 100\%$$

then the profits rate of the metallurgical industry could only be 11 percent, while in the same year, the average capital profit rate of industry in the whole country was 16.5 percent. This difference was mainly due to the failure to stress economic results in the past. In 1980, the broad masses of workers and staff members strengthened their economic concept and made every effort to increase revenue and curtail expenditure in production with remarkable economic results. After striking a balance of profits and losses, the net profits for the entire trade was 6,825 million yuan, a 17.7 percent increase over 1979, much higher than the rate of output value increase in that same period (4.9 percent); and also higher than that of steel (7.7 percent), 10 nonferrous metals (8.9 percent) and gold (15.9 percent). Among those with a fairly wide margin of profit increase (more than 20 percent annually) were the Benxi, Xiantang, Baotou, Wuhan, Shoudu, Chongqing and Hebei metallurgical bureaus; the Kunming, Hangzhou and Anyang iron and steel plants, the Yunnan Smelting Plant, the Baotou Aluminum Plant, the Shaoquan Smelting Plant, the Daye Nonferrous Metal Company, the Southwest Aluminum Processing Plant, the Zhuzhou Smelting Plant and so forth. In the past, the Hangzhou Iron and Steel Plant was running at a loss for a long time. By the end of 1977, its total loss came to 86.06 million yuan. However, it turned its loss into a profit of 19.31 million yuan in 1978; 33.81 million yuan in 1979; and 47.52 million yuan in 1980, or a 41 percent increase over 1979. In 1979, the capital profit rate for the Hangzhou Iron and Steel Plant was 27.3 percent, meaning that in 3.7 years, the total capital could be recovered. In 1980, a number of enterprises with poor economic results were closed, suspended, merged or retooled, and the business management among the small and medium-scale local iron and steel industries was improved. The long sustained losses were then turned into profits among these industries. The net loss of 29.2 billion yuan in 1979 was followed by a net profit of 474 million yuan in 1980. This was a fundamental change. For the entire metallurgical trade, the capital profit rate in 1980 and the profit rate for every 100 yuan's output value were all higher than in the previous year, and the amount of circulating funds used on every 100 yuan's output value was reduced. In the same year, the capital construction force had to look for "rice to cook their own meals" in order to avoid forced idleness. They undertook engineering jobs involving 520 million yuan outside the Ministry and thus made their contribution to the state.

It should also be mentioned that in 1980, second-line metallurgical-economic research institutes were set up at the ministry, bureau and enterprise levels. For example, at the end of 1979, the Ministry of Metallurgical Industry formed the Metallurgical-Economic Research Institute; the Anshan, Benxi, Taiyuan, Wuhan, Baotou and Shenyang Smelting plants and the Fushun Aluminum Plant also set up their own economic research institutes; the Chongqing, Qilu, Fushun, Xinfushin and Kunming Iron and Steel Plants; the Chengdu Seamless Steel Pipe Plant, the Changye and Liangyuan Iron and Steel Plants and the Shenyang Smelting Machinery Plant all set up their economic research offices; and the Huludao Zinc Plant and some others set up their own economic research groups. The metallurgical bureaus in Shanghai, Hebei, Jilin and other provinces and municipalities also set up economic research offices or groups. All these economic research organs are cooperating with the professional workers and the broad masses in conducting specific investigations and study on the economic results of the metallurgical industry and enterprises in the light of realities and with the implementation of the policy of readjustment as the central task. Now they are beginning to play the role of providing reference data for the decision making leaders working on the first line of economic work.

Fifth, 1980 marked the beginning of restructuring in the metallurgical industry and the experiment of expanded decision-making power which brought fresh vitality to the enterprises. By the end of 1980, 277 metallurgical enterprises participated in the experiment of expanded decision-making power. This figure was only 12 percent of the total number of metallurgical production enterprises, but the total output and profits of these experimental enterprises were more than 70 percent and 80 percent respectively of the total profits. Practice has proved the accurate orientation of restructuring which has produced remarkable results and actually enlivened the economy of the enterprises.

First, because of the delegation of financial power to the lower levels, the integration of economic rights, responsibilities and interests has further aroused the enthusiasm of the enterprises and workers. Now the goal of "more revenues for the state, more retained profits for the enterprise, and more income for the workers" has been attained. The enterprises with a profit rate of more than 20 percent in 1980 were all units participating in the experiment of expanded decision-making power. This experiment promoted the increase of income and the reduction of expenditure. The Shanghai Metallurgical Bureau, for example, adopted the system of sharing increased profits on a trade basis, and made a profit of 1,345 million yuan in 1979, a 20 percent increase over 1978; and a profit of 1.47 billion yuan in 1980, a 31.2 percent increase over 1978. In these 2 years, a total profit of 2.58 billion yuan (an increase of 0.34 billion yuan for the state in 2 years) were handed over, and no further state investment was required for the Shanghai bureau's capital construction, renovation or trial production of new products.

Secondly, the old conventional idea that "the means of production are not commodities" was discarded. Under the guidance of state planning, the enterprises have now greater power to dispose of their own products. The combination of planning regulation and market regulation has brought new vitality to some enterprises. In 1980, for example, the Chongqing and the Taiyuan iron and steel plants, the Chengdu Seamless Pipe Plant and the Southwest Aluminum Processing Plant had serious problems with the reduction of orders from the State (the orders received being only enough for 40-60 percent of their productive capacity). By selling their products, they not only overcame the "danger" of a large-scale reduction of production, but also developed more varieties of products, improved their quality, offered better services and raised their management level. The key enterprises in 1980 sold 2.5 million tons, or approximately 14 percent, of their own rolled steel after fulfilling the state tasks. This amount was brought up to 11.07 million tons with the addition of another 8.57 million tons (which was controlled by the localities instead of the state), now being 40.8 percent of the total amount of steel output. Similarly, in 1980, the ratio of nonferrous processing materials sold by the producers themselves amounted to 42 percent of the total output, while the ratio of rare metal, also sold by the producers, rose to 80 percent.

Third, the Ministry of Metallurgical Industry formed the China Metallurgic Products Export Corporation in April 1980. According to the state's unified foreign trade policy, the production enterprises are now enjoying some foreign trade rights. At the end of 1980, this company signed more than 300 contracts with foreign merchants for the export of metallurgical products involving a total amount of more than 0.2 billion dollars, and 62 million dollars were received in settlement of the accounts in the same years. The exported products, mainly pig iron, rolled steel, iron alloy, iron castings, steel castings, various nonferrous and rare metal products, bauxite and graphite anode were sold to more than 120 customers in 16 countries. Pig iron, sponge titanium, titanium ingots and Swallow Brand aluminum plates with hardened surface are all of fine quality and praised as "trustworthy" products. This form of foreign trade, based on a combination of industry and foreign trade and a direct contact between production and demand, is welcomed by foreign merchants, because it provides facilities for both the buying and the selling parties to become familiar with the technology of production.

All these are but preliminary changes. Because of the lack of experience, we have had shortcomings and defects; but the major orientation is correct and the restructuring is in the main successful. In future, as long as it is advantageous to readjustment, we should continue the work of restructuring, sum up our experiences, and gradually improve our work.

Sixth, 1980 was also the year for us to pay greater attention to the mines; to improve the management of enterprises; to raise the scientific and technical levels, to train the entire personnel, to be more concerned for safety in production and for environmental protection; to improve the material and cultural life of the workers and staff members; and to make an all-out advance in the metallurgic industry.

Future Prospects

1. In the past 31 years, we have experienced setbacks in metallurgical industry. The history of these setbacks has given us both positive and negative lessons.

In short, we must act according to the conditions and resources of our country and stress practical results. In the past, we had our shortcomings and made mistakes simply because we departed from Chinese realities. We were too hasty for success and blindly strived for numerically high targets regardless of the need for a scientific overall balance. We attached no importance to the quality of products and failed to stress economic results. Consequently, the investment was excessive; the consumption was high; the quality was poor; the efficiency was low; and the return was little. It was simply a case of "more haste, less speed." We must never repeat these mistakes in future. We should instead get moderate targets and produce the correct products (mainly consumer) goods or other goods to serve national defense and technical transformation in the national economy. We should also improve the quality of products, reduce the consumption (particularly energy consumption), raise the efficiency, reduce the production costs, and increase the economic benefits.

2. Iron and steel industry and nonferrous metal industry belong to the raw and semifinished material departments, and are quite important to national economy and people's livelihood. These industries are also playing important roles in developing the national economy and striving for the four modernizations. At present our metallurgical products, in varieties, quality and quantity, are inadequate for the requirements of our national economic development. From 1949 to 1980, we imported a total of 70 million tons of steel materials of various types. This amounts to 23 percent of our national output in the same period. The amount of copper and aluminum imported amounted to 48.7 percent of our national output in the same period. This shows that we are still far from self-sufficient in metallurgical products. Along with the changes in the structure of our national economy, our demand for iron and steel may be less in terms of quantity, but will be higher and stricter in terms of varieties and quality. Therefore, as long as our national resources permit, it is still very important that we should pay great attention to varieties and quality in the development of iron and steel, and nonferrous metal industries. To reduce state burden in financial materials and energy resources as much as possible, we should start out from our present foundation and stress potential tapping, innovation, transformation and the production of auxiliary equipment.

3. The task of readjustment in the metallurgical industry is arduous and cannot be completed in 1 or 2 years. We should then strive to complete it in the Sixth Five-Year Plan. Within the metallurgical industry, aside from an adequate retreat on the capital construction front, the focus of readjustment should be: to strengthen the mines which now form the weakest link; to change the product mix; to increase the varieties and improve the quality of products; to practice energy conservation vigorously; to promote nonferrous metal production; to raise the management level; to strengthen the scientific and technical force through training and education; to pay greater attention to the cultivation of talents; to improve the livelihood of workers and staff members; and to strengthen safety measures and environmental protection.

4. Through readjustment, it is estimated that in 1985, the material and technical foundation for the metallurgical industry will be much stronger, and greater progress will have been made in the mines, varieties and quality of products; and in energy conservation, technology and enterprise management. At the same time, the output of nonferrous metals and rolled steel will also be correspondingly increased.

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BUILDING MATERIAL INDUSTRY GROWS; FUTURE TASKS OUTLINED

Beijing 1981 ZHONGGUO JINGJI NIANJIAN [1981 ALMANAC OF CHINA'S ECONOMY] in Chinese pp IV 88-91

[Article by Zong Jianwen [1350 7007 2420] of Research Office of the Ministry of Building Materials: "China's Building Material Industry"]

[Text] (1)

The production and use of building materials have had a long history in China. In Old China, however, the building materials industry was very backward, and the equipment of building enterprises was out-dated. Production depended mainly on manual labor and the output was low with little varieties and poor quality. Before liberation, nearly all the high-grade materials required for building "modern mansions" were imported. In 1949, there were only some 40 small enterprises producing cement, plate glass, and bathroom ceramics (not including Taiwan Province; same as follows). Cement output that year was only 660,000 tons and that of plate glass, 1.07 million standard crates (one standard crate contains 10 square meters of 2-millimeter plate glass). The total output value of the building materials industry were only some 50 million yuan.

Since the founding of the People's Republic, and under the leadership of the Party Central Committee and the people's government, the building materials industry has been greatly developed along with the development of the whole national economy. From 1952 to 1980, more than 8 billion yuan was allocated in the state's capital construction budget for investment in the building materials industry; more than 100 large and medium-size plants were completed and commissioned; some 40 others were expanded into large and medium-size ones; and scores more are still under construction. Furthermore, many small building materials plants are being built with funds raised by local governments at various levels and by the people's communes. At present, China has more than 4,600 building materials plants of large, small and medium sizes with more than 3.8 million workers and staff members. More than 5,300 of these plants are owned by the whole people, with some 1.6 million workers; and some 40,000 of them, with some 2.2 million workers, were owned by the collectives. In 1980, cement output reached 79.86 million tons, being 121 times that of 1949, with an average progressive increase of 16.7 percent each year. Plate glass output reached 27.71 million standard crates, an increase of 24.7 times that of 1949, with an average progressive increase of 11 percent each year. The total output value of building materials in the country was 18.15 billion yuan, being [illegible] times that of 1949. Not only the outputs of building materials and nonmetallic mineral products, but also their varieties have been greatly increased. Continued success has been achieved in the production of new building materials, and the layout of this industry has also been improved along with the improvement of technology. The building materials industry has now become an important branch of raw and semifinished materials industry with the responsibility of supplying building materials for industrial and agricultural construction and for the people's housing construction in the urban and rural areas, in addition to the arduous task of providing nonmetallic mineral products and new nonmetallic materials for various sectors of the national economy.

Since the Third Plenary Session of the 11th Party Central Committee, outstanding achievements have been won in the building materials industry in 1979 and 1980 in continuing to develop in the process of readjustment, in accordance with various party principles and policies. Production has steadily increased; the total output value of building materials in 1979 exceeded that of 1978 by 8.7 percent; and that of 1980 exceeded that of 1979 by 5.5 percent. State production quota for the main products were also overfulfilled. Cement output in 1979 exceeded that of 1978 by 13.3 percent; and that of 1980 exceeded that of 1979 by 8.1 percent. Plate glass output in 1979 exceeded that of 1978 by 16.2 percent; and that of 1980 exceeded that of 1979 by 18.9 percent. The quality of all products has been improved, and energy consumption reduced. In 1980, 99.99 percent of the cement produced by the large and medium-size plants were up to the standard, and this was the highest level ever attained. From the small cement enterprises, 85.6 percent of their products were up to the standard in 1980, being 12.18 percent higher than in 1978. In 1980, 77.78 percent of the plate glass, an increase of 4.92 percent over 1978, were rated as first-grade product. In 2 years, 21 building materials plants won national prizes for their fine-quality goods. Three of them won gold medals and 16 of them won silver medals. In 1980, 2.5 million tons of standard coal were saved in the entire trade. For every ton of clinker produced by the large and medium-size plants, the consumption of standard coal was 0.62 kilograms less than that in 1979, and for the production of each heavy crate of plate glass, the consumption of standard coal was reduced by 1.54 kilograms as compared with 1979. There has also been remarkable success in turning losses into profits. The profits of enterprises under the control of different departments under the Ministry of Building Materials in 1979 increased by 32.8 percent over 1978; and those of 1980 again exceeded those of 1979 by 23.2 percent. In 1980, losses incurred by some enterprises were reduced from 27.2 percent in 1979 to 19.3 percent in 1980, and the amount of losses was reduced by 45 percent. In 1979 and 1980, the plans for investment in capital construction were overfulfilled. After the commissioning of a number of new projects, the productive capacity of large and medium-size cement plants was increased by 1.46 million tons. In 1979, the total volume of 10 different building materials exported exceeded that of 1978 by [illegible] percent; and that of 1980 exceeded that of 1979 by 12 percent.

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In [illegible] years since the founding of the People's Republic, our building materials industry has been developed into a large industrial sector consisting of many different trades and producing many different varieties of goods. There are now more than [illegible] varieties controlled by different departments under the Ministry of Building Materials. These varieties are of three different categories:

The first category consists of various building materials other than steel and timber. The main varieties are cement, plate glass, ceramics for bathrooms, brick, tiles, lime, sand, stones, various types of building blocks, waterproof materials, heat insulation materials, gypsum boards, aerated concrete, plastics for building purpose, well papers (cloth), and other light-weight materials.

The second category consists of nonmetallic mineral products. They are mainly asbestos, mica, graphite, talcum, diamond, limestone, quartz sands, Dali stones and granite.

The third category includes new inorganic and nonmetallic materials and finished products processed mainly from the raw and semifinished materials of the other two categories. They are glass fiber, graphite fiber, reinforced plastic, industrial technical glass, quartz glass, special ceramics, caststone, cement boats, cement ties and cement poles for putting up electrical wires.

Apart from the first category which are purely construction engineering materials, and part of the second and third categories used for producing building materials, most of the raw and semifinished materials, with their unique and superior performances, are indispensable to metallurgy, chemical industry, machinery, electronic and aviation; and the development of national defense. Most of the third category materials were developed in the late 1950's, and have helped promote the progress of our industry and our science and technology.

Brief Descriptions of the Development of Cement, Plate Glass and Nonmetallic Mineral Products

Cement industry: The foundation of our cement industry was weak before liberation. The development was slow; the output was low; the layout was irrational; and there was only one variety of product. In the 43 years from 1960--when the first cement plant was built in Tangshan--to 1949, only 35 small cement plants had been built throughout the country (not including Taiwan Province). Most of these plants were concentrated in the northeast and along the coast, and the highest annual output attained during this period was only 2.29 million tons. In 1949, the actual output was only 660,000 tons.

The first 3 years following the founding of the People's Republic were spent in repairing and reactivating some plants that had been destroyed or closed during the years of fighting. After 1953, large-scale development of the cement industry began in earnest, and by 1980, more than 4,200 plants were completed and in operation with more than 700,000 workers and staff members, and an annual output of 79.86 million tons. Among them, there were 50 large and medium-size ones (built with investment by the state who also distributes the products), having nearly 100,000 workers and an output of 25.59 million tons; 4,533 small ones (built with investment by the local governments and the collectives who also distribute their products, with an output of 54.27 million tons. The layout has also been greatly improved. Apart from Xizang and Ningxia autonomous regions, and Tianjin Municipality, large and medium-size plants have been set up in all provinces, municipalities and autonomous regions, while small ones were spread out over 80 percent of all counties in the country. The varieties of cement products have been developed from the former silicate type to the phosphate and aluminum types which include scores of varieties under five major varieties, namely the silicate cement, the slag cement, the ordinary cement, the volcanic ash cement and the coal ash cement. There are also special cements for oilwells and dams, and fast-hardening, fast-setting, and colored cements. Their output is now adequate for economic construction in the country. Along with the development of cement industry, the technical level has also continued to rise. The plants built in the 1950's had mainly to import foreign equipment; but at the same time, they proceeded with the research, design and manufacturing of complete sets of equipment and several different types of mechanized vertical kilns with the small-diameter, medium-diameter, set and semidry methods. In the mid-1950's, research in and experiments with the vortex preheated device began, and after the 1960's, four cement plants had set up production lines using multigrade vortex preheated device and preheated vertical cylinders. In the early 1970's, study in the new technique of "decomposition outside the kiln" began and experimental production lines for decomposition outside the fuel- or coal-burning kilns were later completed. At present, the design and manufacturing of these production lines with a daily output of 2,000 tons is in progress. In 1979, we also imported complete sets of equipment for the new technology of "decomposition outside the kiln."

The development of the small cement industry mainly using vertical kilns is of special significance in our country. Our small cement industry was at first intended for farmland capital construction and the transformation in rural housing. It developed slowly with self-raised funds in the localities under the spirit of self-reliance and hard struggle. Its development has not only played a great role in the development of agricultural production, but also made valuable contributions to the development of local industries, communications and transportation, and other key state projects. There are now more than 4,533 small cement plants in the country, and in 1980, their total output reached 54.27 million tons or two-thirds of the total cement output in the country. In 1980, the output of enterprises owned by the whole people at or above the county level was more than 47 million tons; and the output of those run by the collectives at the commune or production brigade levels was more than 7 million tons. These small cement enterprises began their operation with simple and crude equipment and backward techniques and management, and there were frequent problems with the quality of products and the high production costs. After many years of consolidation, training and technical guidance, and particularly since 1979, following the implementation of the policy of "readjustment, restructuring, reorganization and upgrading," the departments in charge and the plants have done a great deal of work in improving the quality of products, lowering the production costs, raising the technical and management levels and increasing the economic benefits. The situation has now been greatly improved. Such improvement was shown by investigations carried out in 2,166 small cement plants concerning the quality of their products. In 1980, [illegible] percent, an increase of 12 percent over 1979, of the cement produced was up to the required standard, and 95 percent of the up-to-standard products was of the 400 or higher grades; while the amount of 500-grade cement was increased from 2.64 million tons in 1978 to [illegible] million tons. Losses have been reduced and profits have been increased. Compared with 1978, the losses sustained by the enterprises at or above the county level in 1980 were lowered from 42 percent to 23 percent. The number of provinces, municipalities and autonomous regions where profits had been made in the cement trade increased from 14 to 28. In 1979 and 1980, the average annual output increased by 6 million tons and the annual progressive rate of increase was 11.3 percent. In eight provinces, namely, Jiangsu, Shandong, Hebei, Hunan, Honan, Liaoning, Sichuan and Guangdong, the cement output was more than 3 million tons.

The rapid development of our small cement industry has proved that while concentrating our resources on building a large number of large and medium-size cement plants to serve as the backbone force in meeting the requirements of key state projects in our country--which as a large area and a huge population, but a weak economic foundation and a backward economy--bringing the initiative from the localities into play through full utilization of the rich resources of limestones in various localities and by adapting measures to local conditions in producing for local consumption as a means of developing the cement industry; meeting the needs in the countryside; supplementing the production of the large cement industry; bringing about a combination large, small and medium-size enterprises in the cement industry; and bringing prosperity to both the central and the local enterprises, is a correct way which is entirely consistent with our national conditions.

Plate glass industry: Construction of the first plate glass plant in our country (the Qinhuangdao Plant of the Yaohua Glass Corporation Limited) began in 1922, and was completed and commissioned in 1924. Its daily output was 400-500 standard crates of plate glass. Before liberation, ther were only three plate glass plants, and in 1949, their output was only 1.08 million standard crates. After the founding of the People's Republic, nine large and medium-size plants were built, and three others were expanded with state investment. There were then 12 large and medium-size plants with more than 30,000 workers and staff members. The localities also set up more than 100 small plate glass plants. Because of the very tight supply of plate glass, and along with the readjustment of the national economy, some enterprises of other industrial departments were retooled in the past 2 years to produce plate glass, and the number of these small plants was doubled. In 1980, the national output of plate glass was 27.71 million standard crates, an 18.9 percent increase over 1979. Some 17.66 million standard crates were produced by the large and medium-size plants, while 10.06 million standard crates were produced by the small ones. [figures as published] With the increase in the varieties of plate glass, the scope of its utilization was also enlarged. Before liberation, only the window glass and small quantities of glazed glass and glass with glued-on floral designs were produced. Now, besides window glass of various thicknesses, we are producing scores of varieties including polished glass, laminated glass, glass reinforced with wires, glass with embossed designs, toughened glass, curved plate glass, endothermic glass, electricity conducting glass and bullet-proof glass, all of which are extensively used in the light, electronic, motor vehicles, aviation, chemical and instrument and meter industries as well as in agriculture.

At present, the technology used in producing plate glass is mostly the old slot method. The output of big kilns using 9 machines is close to that of advanced countries. In 1971, we manufactured, designed and completed an experimental line with the floating method. The several large and medium-size plants still under construction have already elected to use the floating method.

Nonmetallic mineral product industry: Nonmetallic mineral products were the earliest and most extensive used products by mankind. We have rich mineral resources and a complete assortment of this kind of products, and nearly 80 varieties of them have been verified. Among them are the iron pyrites, gypsum and barite, which occupy the foremost rank in the world. The reserves of asbestos, fluorite, and expandable clay rank second in the world, while those of phosphorus, talcum prophyllite, graphite, kaolin, magnesite, salt, pearlite, limestone and mica are also in the foremost rank in the world. Before liberation, however, we had only a very few mines of pyrite and phosphorus, and some mines of asbestos, gypsum and talcum mines with very low yields. Other than these, we had practically nothing.

Some rare nonmetallic mineral products have many special characteristics such as their being heat resistant, acid- and alkaline-resistant, oxidization-resistant, radiational-proof; and their high tensile strength, extra hardness, insulation (including heat-insulation and sound-insulation). They are indispensable raw materials for modern industry, national defense industry and sophisticated science and technology. Since the founding of the People's Republic, our government has attached great importance to the development of products from seven important nonmetallic mineral materials, namely, asbestos, gypsum, graphite, kaolin, talcum, mica and diamond. In the past 31 years, we have set up 281 enterprises with 124,000 workers and staff members under the system of ownership by the whole people at or above the county level. There were among them 50 large and medium-size enterprises with a total of 74,000 workers and staff members. The output has also been greatly increased. In 1980, the output of asbestos was 131,700 tons; which was 219 times that of 1949; that of gypsum, 3,348,000 tons, being 341 times that of 1949; and of graphite, 160,000 tons, being 178 times that of 1949; and that of talcum, 915,000 tons, or 397 times that of 1949.

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Since the founding of the People's Republic, our building material industry has been greatly developed and improved with regard to quantity, quality, varieties, production technology and scientific research. It has made definite contributions to the development of the national economy and the improvement of people's livelihood. However, the speed of growth is far from adequate for the national economy and the need in people's daily life. The contradiction between supply and demand is sharp; the technology and equipment used are backward; the economic results produced are poor; and the manpower for scientific research, design, equipment-manufacturing is weak. From 1952 to 1978, the average rate of increase in the building materials industry was 11.5 percent, and much lower than the average increase rate in heavy industry. Except for the First Five-Year Plan and the 1962-1964 period, the average growth rate of all products, other than cement, plate glass and some main products, was lower than that of industry as a whole in the country. Apart from a small number of products, such as mica, glass fiber and quartz glass, nearly all items are in short supply. There is a shortage of cement by millions of tons every year for the key state construction engineering projects and for repairs in the cities. The shortage of plate glass is even more serious, because the annual output can meet only about 40 percent of the demand for capital construction and other projects in the cities, and hardly any of it can be left for the countryside. The output of bathroom ceramics can meet only one-third of the demand; that of asbestos, about 70 percent; and that of feldspar, only 30 percent. These shortages are mainly caused by the mistakes of the "leftist" guiding thought in national economic development, and our inadequate knowledge of the important role played by the building materials industry in the national economy, with a disproportionate development of the national economy as the result. In the 27 years from 1952 to 1978, investment on building materials industry amounted to only 1.7 percent of the total national investment in capital construction. This ratio is certainly much lower than the investment in heavy industry. That was why for a long time, building materials industry has been a weak link in the national economy.

Since the Third Plenum of the 11th Party Central Committee, the Party Central Committee and the State Council have attached great importance to the development of this industry and clearly pointed out that the building materials industry, like the coal, power, oil and communications and transportation industries, is a forerunner in the national economy. We must study the ways and means to orientate the development of this industry to our people numbering 1 billion and on the basis of our national conditions. Since building materials are in short supply, the industry should be developed at increased speed during the readjustment of the national economy.

In accordance with the directive of the Party Central Committee, the policy of readjustment should be further implemented in the building materials industry. Positive measures, based on the needs of 1 billion people, should be adopted to develop production so that it will be adequate for the needs of national economic development and of housing construction in the urban and rural areas.

First, the existing enterprises should be set in order. We have now more than 46,000 building materials enterprises and a fairly good material foundation. We must resolutely readjust and consolidate these enterprises, carry out technical transformation, upgrade their equipment and adopt new technology and work process to the maximum extent in order to raise the technical and management level, to tap the potential and to increase the economic benefits. This is the main way to insure the active development of production in the building materials industry. We must make every effort to imrove the quality of products, increase the varieties and designs, and produce more easily marketable products that are attractive in appearance and low in prices. We must strive for energy conservation and carry out effective safety measures in production and environmental protection.

We should attach great importance to the readjustment and consolidation of small enterprises. All small enterprises under favorable conditions of resources for production should be transformed and upgraded in a planned way. The small number of enterprises having no assurance of raw materials and fuel supplies, producing goods of inferior quality at high production costs, and incurring losses over a long period should be merged or retooled in a planned way.

Second, the production of cement, plate glass and other main building materials should be vigorously developed. In view of our national conditions, it is impractical for us to use a lot of timber and steel as building materials. For housing construction in urban and rural areas, we have for a long time used bricks and tiles made of clay. However, this brings damage to the farmland, requires high energy consumption and is therefore undesirable. For building materials in future, we should vigorously develop the use of concrete, plate glass and bathroom ceramics, to be supplemented with new light-weight materials so as to reduce the use of clay bricks and tiles. We must make great efforts to manufacture some substitute materials which can be produced with less energy consumption and for which we have abundant resources. The output figures of cement in our country may seem impressive, but viewed on a per capita basis, it works out to only 80 kilograms (230 kilograms for the world average and more than 700 kilograms in Japan). We must accelerate the development of cement and plate glass industries mainly with transforming and expanding the old plants and suitably building new ones.

Third, we must supply more building materials for the countryside. In the past several years, the rural economy has undergone great changes, and peasants' incomes have been much increased. House building in the countryside is now going on at a speed rarely witnessed since the founding of the People's Republic. Housebuilding is now a matter of major concern for the countryside. In 1980, approximately 5 million peasant households built or rebuilt their homes, and the area taken by new houses amounted to more than 30 million square meters. For a long time, when planning for a balanced distribution of building materials, we were mainly concerned with the needs for budgeted capital construction investment, and paid little attention to the peasants' needs. Hence the severe shortage of building materials for the countryside. In 1980, the state and various provinces and municipalities set aside nearly 100,000 tons of steel materials to be used for making cement components, and nearly 900,000 standard crates of plate glass for the rural areas. This action was warmly hailed by the peasants. In future, the state should continue to increase the supply of steel materials and plate glass to these areas.

The scope of housebuilding in the countryside will continue to expand in future, and the demand for building materials will also continue to increase. We have a huge area, and the conditions of climate, geography, resources, and habits of living vary a great deal in different localities. The economic development likewise cannot be even. To solve the problem of materials for housebuilding in rural areas, we must proceed from realities, firmly adhere to the principle of adapting measures to local conditions and making use of locally available materials, and make full use of the local resources (such as river mud, earth mounds, and small cement industry) and various industrial slag for making brick, tile and small blocks. We can also make use of bamboo and stones, but must reduce the use of clay for making bricks and tiles in order to avoid damage to the farmland.

Fourth, we must accelerate the production of the new light-weight building materials. We began our research on the production of light-weight building materials way back in the 1960's, and set up plants for the production of aerated concrete. Since 1975, we have rather systematically carried out scientific research in the design and production of new building materials. In 1980, 38 production lines were completed in the country for the mass production of 36 types of new materials. We also set up two small production bases, and another seven bases of large, small and medium sizes are still under construction. From 1976 to 1980, 34 cities in the country began to use new light-weight materials for building offices and residential homes with a total floorspace of some 500,000 square meters. Houses built of light-weight materials have many merits, such as light weight, uniformity and convenience for on-the-spot assembling. The construction period is short; labor productivity is higher; and industrial slags can be used in large quantities as raw materials. This will be the future orientation for the development of building materials. However, the process of production and the required technical equipment are rather complicated. Proceeding from our national conditions, we should first carry out experiments in some selected large and medium-size cities, set up construction bases and build houses by separate blocks so that we can analyze and compare the technical and economic results and gradually popularize our experiences. At the same time, we should continue to strengthen our scientific research and trial production, and selectively overcome the difficulties in applied technology.

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